APPENDICES
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Region M Regional Planning Group
Final Plan: January 5, 2006

APPENDIX A

TWDB EXHIBIT TABLES
TASK EXHIBITS

Texas Water Development Board
2006 Regional Water Plan Population Projections for 2000 - 2060:
Region M - Rio Grande

REGION	WATER USER GROUP	COUNTY NAME	P2000 [1)]	P2010	P2020	P2030	P2040	P2050	P2060	Region Split Pop. [2)]	County Split Pop. [3)]
M	BROWNSVILLE	CAMERON	139,722	173,986	210,210	247,653	284,979	322,316	357,828		
M	COMBES	CAMERON	2,553	3,089	3,655	4,240	4,823	5,407	5,962		
M	COUNTY-OTHER	CAMERON	38,872	45,090	51,663	58,457	65,231	72,006	78,449		
M	EAST RIO HONDO WSC	CAMERON	13,741	19,904	26,420	33,155	39,869	46,585	52,973		
M	EL JARDIN	CAMERON	8,341	10,859	13,521	16,274	19,017	21,761	24,371		
M	HARLINGEN	CAMERON	57,564	66,805	76,575	86,674	96,741	106,811	116,389		
M	INDIAN LAKE	CAMERON	541	699	866	1,039	1,211	1,383	1,547		
M	LA FERIA	CAMERON	6,115	7,954	9,898	11,908	13,912	15,916	17,822		
M	LAGUNA MADRE WD	CAMERON	4,242	7,725	11,408	15,215	19,010	22,806	26,416		
M	LAGUNA VISTA	CAMERON	1,658	2,174	2,719	3,282	3,844	4,406	4,940		
M	LOS FRESNOS	CAMERON	4,512	6,649	8,908	11,243	13,571	15,899	18,114		
M	LOS INDIOS	CAMERON	1,149	1,418	1,703	1,997	2,290	2,583	2,862		
M	MILITARY HIGHWAY WSC	CAMERON	8,961	11,440	14,061	16,770	19,471	22,173	24,742		P
M	OLMITO WSC	CAMERON	4,479	7,261	10,203	13,244	16,275	19,307	22,191		
M	PALM VALLEY	CAMERON	1,298	1,402	1,512	1,625	1,738	1,851	1,959		
M	PALM VALLEY ESTATES UD	CAMERON	250	344	444	547	650	753	851		
M	PORT ISABEL	CAMERON	4,865	5,282	5,723	6,179	6,633	7,088	7,520		
M	PRIMERA	CAMERON	2,723	3,449	4,217	5,011	5,802	6,593	7,346		
M	RANCHO VIEJO	CAMERON	1,754	2,665	3,628	4,623	5,615	6,607	7,551		
M	RIO HONDO	CAMERON	1,942	2,098	2,263	2,434	2,604	2,774	2,936		
M	SAN BENITO	CAMERON	23,444	26,922	30,599	34,400	38,189	41,979	45,584		
M	SANTA ROSA	CAMERON	2,833	3,472	4,148	4,847	5,543	6,240	6,903		
M	SOUTH PADRE ISLAND	CAMERON	2,422	3,203	4,028	4,881	5,732	6,583	7,392		
M	VALLEY MUD #2	CAMERON	1,246	1,246	1,246	1,246	1,246	1,246	1,246		
		CAMERON Total	335,227	415,136	499,618	586,944	673,996	761,073	843,894		

M	ALAMO	HIDALGO	14,760	20,915	28,107	36,163	44,880	54,400	64,166		
M	ALTON	HIDALGO	4,384	12,342	15,513	19,064	22,907	27,104	31,411		
M	COUNTY-OTHER	HIDALGO	60,808	80,235	109,064	141,351	176,285	214,445	253,592		
M	DONNA	HIDALGO	14,768	16,757	19,080	21,682	24,498	27,574	30,729		
M	EDCOUCH	HIDALGO	3,342	3,778	4,287	4,858	5,475	6,149	6,841		
M	EDINBURG	HIDALGO	48,465	64,792	83,869	105,237	128,358	153,611	179,517		
M	ELSA	HIDALGO	5,549	5,838	6,175	6,553	6,962	7,408	7,866		
M	HIDALGO	HIDALGO	7,322	11,109	15,534	20,491	25,854	31,711	37,720		
M	HIDALGO COUNTY MUD #1	HIDALGO	3,400	5,280	7,476	9,936	12,598	15,505	18,487		
M	LA JOYA	HIDALGO	3,303	3,960	4,727	5,587	6,518	7,534	8,576		
M	LA VILLA	HIDALGO	1,305	1,305	1,305	1,305	1,305	1,305	1,305		
M	MCALLEN	HIDALGO	106,414	127,458	152,045	179,586	209,386	241,933	275,322		
M	MERCEDES	HIDALGO	13,649	14,546	15,595	16,770	18,041	19,429	20,853		
M	MILITARY HIGHWAY WSC	HIDALGO	8,819	10,364	12,169	14,191	16,379	18,769	21,220		P
M	MISSION	HIDALGO	45,408	61,154	79,551	100,157	122,454	146,807	171,790		
M	NORTH ALAMO WSC	HIDALGO	80,960	114,538	153,770	197,713	245,263	297,197	350,473		P
M	PALMHURST	HIDALGO	4,872	9,144	14,136	19,727	25,777	32,384	39,162		
M	PALMVIEW	HIDALGO	4,107	6,258	8,771	11,586	14,632	17,959	21,372		
M	PENITAS	HIDALGO	1,167	1,201	1,241	1,285	1,333	1,385	1,439		
M	PHARR	HIDALGO	46,660	59,571	74,656	91,553	109,836	129,805	150,291		
M	PROGRESO	HIDALGO	4,851	6,348	8,097	10,056	12,176	14,491	16,866		
M	SAN JUAN	HIDALGO	26,229	39,074	54,082	70,892	89,081	108,947	129,327		
M	SHARYLAND WSC	HIDALGO	27,988	31,885	36,438	41,538	47,057	53,085	59,268		
M	SULLIVAN CITY	HIDALGO	3,998	5,528	7,315	9,317	11,483	13,849	16,276		
M	WESLACO	HIDALGO	26,935	30,878	35,485	40,645	46,229	52,328	58,584		
		HIDALGO Total	**569,463**	**744,258**	**948,488**	**1,177,243**	**1,424,767**	**1,695,114**	**1,972,453**		
M	COUNTY-OTHER	JIM HOGG	783	829	887	932	969	959	923		
M	HEBBRONVILLE (CDP)	JIM HOGG	4,498	4,764	5,098	5,354	5,569	5,509	5,302		
		JIM HOGG Total	**5,281**	**5,593**	**5,985**	**6,286**	**6,538**	**6,468**	**6,225**		

M	COUNTY-OTHER	MAVERICK	19,649	25,098	30,862	36,312	41,036	45,358	48,864		
M	EAGLE PASS	MAVERICK	22,413	23,800	25,267	26,654	27,856	28,956	29,849		
M	EL INDIO WSC	MAVERICK	5,235	6,994	8,855	10,615	12,140	13,536	14,668		
		MAVERICK Total	**47,297**	**55,892**	**64,984**	**73,581**	**81,032**	**87,850**	**93,381**		
M	COUNTY-OTHER	STARR	28,770	37,826	47,504	57,471	67,517	77,418	86,919		
M	LA GRULLA	STARR	1,211	1,211	1,211	1,211	1,211	1,211	1,211		
M	RIO GRANDE CITY	STARR	11,923	13,061	14,277	15,529	16,791	18,035	19,229		
M	RIO WSC	STARR	2,076	2,942	3,868	4,821	5,782	6,729	7,638		
M	ROMA CITY	STARR	9,617	11,097	12,678	14,306	15,948	17,566	19,118		
		STARR Total	**53,597**	**66,137**	**79,538**	**93,338**	**107,249**	**120,959**	**134,115**		
M	COUNTY-OTHER	WEBB	6,592	7,651	8,895	10,287	11,817	13,491	15,259		
M	EL CENIZO	WEBB	3,545	5,929	8,729	11,865	15,315	19,085	23,068		
M	LAREDO	WEBB	176,576	234,423	302,377	378,468	462,176	553,670	650,317		
M	RIO BRAVO	WEBB	5,553	8,318	11,566	15,203	19,205	23,579	28,199		
M	WEBB COUNTY WATER UTILITY	WEBB	851	1,326	1,884	2,509	3,197	3,949	4,743		
		WEBB Total	**193,117**	**257,647**	**333,451**	**418,332**	**511,710**	**613,774**	**721,586**		
M	COUNTY-OTHER	WILLACY	385	385	385	385	385	385	384		
M	LYFORD	WILLACY	1,973	2,091	2,207	2,313	2,398	2,456	2,485		
M	NORTH ALAMO WSC	WILLACY	5,696	7,187	8,649	9,981	11,052	11,781	12,141		P
M	RAYMONDVILLE	WILLACY	9,733	10,071	10,402	10,704	10,947	11,112	11,194		
M	SAN PERLITA	WILLACY	680	747	812	871	919	952	968		
M	SEBASTIAN MUD	WILLACY	1,615	2,038	2,452	2,830	3,134	3,340	3,442		
		WILLACY Total	**20,082**	**22,519**	**24,907**	**27,084**	**28,835**	**30,026**	**30,614**		
M	COUNTY-OTHER	ZAPATA	7,326	9,169	11,361	13,559	15,630	17,498	18,877		
M	ZAPATA (CDP)	ZAPATA	4,856	4,856	4,856	4,856	4,856	4,856	4,856		
		ZAPATA Total	**12,182**	**14,025**	**16,217**	**18,415**	**20,486**	**22,354**	**23,733**		
		REGION M TOTAL	**1,236,246**	**1,581,207**	**1,973,188**	**2,401,223**	**2,854,613**	**3,337,618**	**3,826,001**		

2006 Regional Water Plan
Municipal Water Demand Projections for 2000 - 2060 (in acft[1])
Region M

Region	WUG Name	County Name	D2000	D2010	D2020	D2030	D2040	D2050	D2060
M	BROWNSVILLE	CAMERON	35,840	43,655	52,038	60,475	69,270	77,985	86,577
M	COMBES	CAMERON	186	208	229	256	281	309	341
M	COUNTY-OTHER	CAMERON	6,226	6,970	7,812	8,709	9,572	10,485	11,424
M	EAST RIO HONDO WSC	CAMERON	1,739	2,408	3,107	3,862	4,555	5,323	6,052
M	EL JARDIN	CAMERON	1,514	1,910	2,332	2,771	3,216	3,656	4,095
M	HARLINGEN	CAMERON	10,059	11,374	12,780	14,175	15,604	17,109	18,643
M	INDIAN LAKE	CAMERON	40	49	57	66	76	85	95
M	LA FERIA	CAMERON	699	855	1,031	1,214	1,403	1,587	1,777
M	LAGUNA MADRE WD	CAMERON	1,288	2,310	3,386	4,516	5,622	6,744	7,812
M	LAGUNA VISTA	CAMERON	214	268	323	382	444	503	564
M	LOS FRESNOS	CAMERON	541	767	1,008	1,247	1,490	1,745	1,988
M	LOS INDIOS	CAMERON	193	230	271	311	354	396	439
M	MILITARY HIGHWAY WSC	CAMERON	1,214	1,486	1,780	2,066	2,378	2,683	2,993
M	OLMITO WSC	CAMERON	612	952	1,314	1,691	2,060	2,444	2,809
M	PALM VALLEY	CAMERON	390	413	440	468	494	525	555
M	PALM VALLEY ESTATES UD	CAMERON	63	85	108	132	155	180	203
M	PORT ISABEL	CAMERON	2,458	2,645	2,846	3,052	3,254	3,470	3,681
M	PRIMERA	CAMERON	433	525	628	730	838	945	1,053
M	RANCHO VIEJO	CAMERON	253	373	496	627	755	888	1,015
M	RIO HONDO	CAMERON	385	404	428	453	475	503	533
M	SAN BENITO	CAMERON	4,386	4,916	5,484	6,050	6,630	7,241	7,863
M	SANTA ROSA	CAMERON	286	331	376	429	478	531	588
M	SOUTH PADRE ISLAND	CAMERON	1,910	2,504	3,136	3,789	4,443	5,095	5,722
M	VALLEY MUD #2	CAMERON	863	858	854	850	846	843	843
		CAMERON Total	**71,792**	**86,496**	**102,264**	**118,321**	**134,693**	**151,275**	**167,665**
M	ALAMO	HIDALGO	1,703	2,319	3,022	3,808	4,675	5,667	6,684
M	ALTON	HIDALGO	1,208	3,346	4,153	5,061	6,056	7,135	8,268

M	COUNTY-OTHER	HIDALGO	7,833	9,886	13,072	16,626	20,536	24,981	29,542
M	DONNA	HIDALGO	2,101	2,309	2,565	2,842	3,156	3,521	3,924
M	EDCOUCH	HIDALGO	460	499	547	604	668	744	828
M	EDINBURG	HIDALGO	6,460	8,274	10,428	12,967	15,528	18,583	21,717
M	ELSA	HIDALGO	1,063	1,099	1,134	1,182	1,232	1,303	1,383
M	HIDALGO	HIDALGO	730	1,058	1,444	1,859	2,316	2,841	3,380
M	HIDALGO COUNTY MUD #1	HIDALGO	1,116	1,703	2,387	3,161	3,994	4,915	5,860
M	LA JOYA	HIDALGO	359	408	471	538	613	700	797
M	LA VILLA	HIDALGO	240	234	230	225	221	218	218
M	MCALLEN	HIDALGO	24,436	28,697	33,551	39,226	45,267	52,032	59,213
M	MERCEDES	HIDALGO	1,835	1,890	1,956	2,048	2,142	2,285	2,453
M	MILITARY HIGHWAY WSC	HIDALGO	1,195	1,346	1,540	1,748	2,000	2,271	2,568
M	MISSION	HIDALGO	7,579	9,864	12,564	15,594	18,792	22,529	26,363
M	NORTH ALAMO WSC	HIDALGO	8,706	11,675	15,158	19,046	23,352	28,297	33,369
M	PALMHURST	HIDALGO	622	1,157	1,789	2,497	3,263	4,099	4,957
M	PALMVIEW	HIDALGO	589	869	1,199	1,570	1,967	2,414	2,873
M	PENITAS	HIDALGO	149	149	150	150	151	155	161
M	PHARR	HIDALGO	6,899	8,474	10,370	12,511	14,887	17,448	20,202
M	PROGRESO	HIDALGO	456	576	717	867	1,037	1,234	1,436
M	SAN JUAN	HIDALGO	2,497	3,501	4,665	5,956	7,384	9,031	10,720
M	SHARYLAND WSC	HIDALGO	4,420	4,893	5,469	6,095	6,747	7,492	8,365
M	SULLIVAN CITY	HIDALGO	403	526	672	845	1,016	1,226	1,440
M	WESLACO	HIDALGO	4,978	5,534	6,201	6,966	7,819	8,792	9,843
		HIDALGO Total	**88,037**	**110,286**	**135,454**	**163,992**	**194,819**	**229,913**	**266,564**
M	COUNTY-OTHER	JIM HOGG	147	153	159	164	167	165	158
M	HEBBRONVILLE (CDP)	JIM HOGG	705	731	759	780	792	778	748
		JIM HOGG Total	**852**	**884**	**918**	**944**	**959**	**943**	**906**
M	COUNTY-OTHER	MAVERICK	2,223	2,727	3,249	3,742	4,183	4,573	4,926
M	EAGLE PASS	MAVERICK	4,720	4,932	5,123	5,314	5,460	5,644	5,818
M	EL INDIO WSC	MAVERICK	968	1,253	1,567	1,855	2,108	2,335	2,530
		MAVERICK Total	**7,911**	**8,912**	**9,939**	**10,911**	**11,751**	**12,552**	**13,274**
M	COUNTY-OTHER	STARR	4,866	6,228	7,663	9,141	10,663	12,141	13,631

M	LA GRULLA	STARR	643	639	635	631	627	624	624
M	RIO GRANDE CITY	STARR	2,404	2,575	2,751	2,957	3,141	3,353	3,576
M	RIO WSC	STARR	351	484	624	772	913	1,063	1,206
M	ROMA CITY	STARR	2,413	2,722	3,053	3,397	3,751	4,112	4,476
		STARR Total	**10,677**	**12,648**	**14,726**	**16,898**	**19,095**	**21,293**	**23,513**
M	COUNTY-OTHER	WEBB	1,226	1,388	1,575	1,786	2,025	2,296	2,599
M	EL CENIZO	WEBB	417	671	968	1,302	1,664	2,074	2,506
M	LAREDO	WEBB	39,558	51,467	65,032	80,548	97,846	116,596	136,948
M	RIO BRAVO	WEBB	759	1,090	1,490	1,924	2,409	2,958	3,538
M	WEBB COUNTY WATER UTILITY	WEBB	158	239	336	441	559	690	829
		WEBB Total	**42,118**	**54,855**	**69,401**	**86,001**	**104,503**	**124,614**	**146,420**
M	COUNTY-OTHER	WILLACY	216	215	213	212	211	210	209
M	LYFORD	WILLACY	290	297	307	313	317	322	326
M	NORTH ALAMO WSC	WILLACY	613	733	853	961	1,052	1,122	1,156
M	RAYMONDVILLE	WILLACY	1,668	1,681	1,701	1,715	1,717	1,730	1,743
M	SAN PERLITA	WILLACY	99	105	112	117	120	124	126
M	SEBASTIAN MUD	WILLACY	212	256	297	333	362	382	393
		WILLACY Total	**3,098**	**3,287**	**3,483**	**3,651**	**3,779**	**3,890**	**3,953**
M	COUNTY-OTHER	ZAPATA	1,001	1,232	1,514	1,792	2,048	2,293	2,474
M	ZAPATA (CDP)	ZAPATA	1,050	1,033	1,017	1,001	985	974	974
		ZAPATA Total	**2,051**	**2,265**	**2,531**	**2,793**	**3,033**	**3,267**	**3,448**
		Region M Total	**226,536**	**279,633**	**338,716**	**403,511**	**472,632**	**547,747**	**625,743**

[1)] An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

Projections last updated on 11/19/03

2006 Regional Water Plan
Manufacturing Water Demand Projections for 2000 - 2060 (in acft[1])
Region M

Region	County Name[2]	D2000	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	3,430	4,156	4,590	4,983	5,372	5,709	6,165
M	HIDALGO	2,674	3,236	3,559	3,851	4,143	4,403	4,742
M	JIM HOGG	0	0	0	0	0	0	0
M	MAVERICK	56	64	69	73	77	80	85
M	STARR	0	0	0	0	0	0	0
M	WEBB	23	28	31	34	37	39	42
M	WILLACY	25	25	25	25	25	25	25
M	ZAPATA	0	0	0	0	0	0	0
	Region M Total	**6,208**	**7,509**	**8,274**	**8,966**	**9,654**	**10,256**	**11,059**

1) An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

2) If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

Projections last updated on 11/19/03

2006 Regional Water Plan

Mining Water Demand Projections for 2000 - 2060 (in acft[1])

Region M

Region	County Name[2]	D2000	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	8	6	6	6	6	6	6
M	HIDALGO	1,196	1,442	1,561	1,633	1,704	1,774	1,836
M	JIM HOGG	27	33	36	37	38	39	40
M	MAVERICK	140	156	162	166	169	172	175
M	STARR	1,203	1,315	1,355	1,373	1,390	1,407	1,426
M	WEBB	1,262	1,204	1,192	1,189	1,187	1,185	1,180
M	WILLACY	6	6	6	6	6	6	6
M	ZAPATA	27	24	23	23	23	23	23
	Region M Total	**3,869**	**4,186**	**4,341**	**4,433**	**4,523**	**4,612**	**4,692**

1) An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

2) If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

Projections last updated on 11/19/03

2006 Regional Water Plan
Steam Electric Water Demand Projections for 2000 - 2060 (in acft[1])
Region M

Region	County Name[2]	D2000	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	1,498	1,616	1,523	1,780	2,094	2,477	2,944
M	HIDALGO	3,487	10,355	14,151	16,545	19,462	23,018	27,354
M	JIM HOGG	0	0	0	0	0	0	0
M	MAVERICK	0	0	0	0	0	0	0
M	STARR	0	0	0	0	0	0	0
M	WEBB	1,795	1,492	1,190	1,391	1,636	1,935	2,300
M	WILLACY	0	0	0	0	0	0	0
M	ZAPATA	0	0	0	0	0	0	0
	Region M Total	**6,780**	**13,463**	**16,864**	**19,716**	**23,192**	**27,430**	**32,598**

[1] An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

[2] If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

Projections last updated on 11/19/03

2006 Regional Water Plan
Livestock Water Demand Projections for 2000 - 2060 (in acft[1])
Region M

Region	County Name[2)]	D2000	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	1,103	1,103	1,103	1,103	1,103	1,103	1,103
M	HIDALGO	681	681	681	681	681	681	681
M	JIM HOGG	518	518	518	518	518	518	518
M	MAVERICK	260	260	260	260	260	260	260
M	STARR	1,117	1,117	1,117	1,117	1,117	1,117	1,117
M	WEBB	1,513	1,513	1,513	1,513	1,513	1,513	1,513
M	WILLACY	151	151	151	151	151	151	151
M	ZAPATA	474	474	474	474	474	474	474
	Region M Total	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**

[1)] An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

[2)] If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

Projections last updated on 11/19/03

APPENDIX B

REGION M WATER RIGHTS

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
	Use Types: 1 = muni; 2 =industrial; 3 = irrigation; 4 =mining; 11 = Domestic and livestock; 5 = hydroelectric; 6 = Navigation; 7 = Recreation; 8 = Other; 9 = Recharge; 13 = Storage				
66	EAST RIO HONDO WSC	Cameron	17.59	23	1
67	EAST RIO HONDO WSC	Cameron	40	23	1
72	FALCON RURAL WSC	Cameron	85	23	1
73	EAST RIO HONDO WSC	Cameron	70	23	1
81	LA JOYA WSC	Cameron	750.0525	23	1
151	BOCA CHICA WATER SUPPLY INC	Cameron	20	23	1
202	VALLEY MUD 2	Cameron	898	23	1
217	LEONEL BAZAN	Cameron	7.52	23	1
223	CITY OF HARLINGEN	Cameron	162	23	1
284	EAST RIO HONDO WSC	Cameron	75	23	1
296	EAST RIO HONDO WSC	Cameron	21.3	23	1
339	RIO WSC	Cameron		23	1
461	NORTH ALAMO WSC	Cameron		23	1
461	EPHRAIM L BLOCK	Cameron	62.5	23	1
625	ARROYO WSC	Cameron	60	23	1
817	SANTA MARIA ID CAMERON CO 4	Cameron	60	23	1
821	CITY OF LYFORD	Cameron	370.325	23	1
831	HARLINGEN IRR DIST	Cameron	18320	23	1
831	MILITARY HIGHWAY WSC	Cameron	613.63315	23	1
831	CITY OF HARLINGEN WATERWORKS SYSTEM	Cameron	1875	23	1
838	CAMERON CO WID #16	Cameron	189	23	1
838	EAST RIO HONDO WSC	Cameron	515	23	1
838	EAST RIO HONDO WSC	Cameron	1337.262	23	1
840	CITY OF HARLINGEN	Cameron	131.1725	23	1
841	CAMERON CO IRR DIST NO 2	Cameron	5500	23	1
841	CAMERON CO IRR DIST NO 2	Cameron	4767.5	23	1
841	CAMERON CO IRR DIST NO 2	Cameron	890	23	1
841	CAMERON CO IRR DIST NO 2	Cameron	750	23	1
841	EAST RIO HONDO WSC	Cameron	750	23	1
843	BROWNSVILLE IRRIGATION DISTRICT	Cameron	6071	23	1
850	LAGUNA MADRE WATER DISTRICT	Cameron	3450.348	23	1
850	LAGUNA MADRE WATER DISTRICT	Cameron	3750	23	1
853	CITY OF LOS FRESNOS	Cameron	911.6546	23	1
854	OLMITO WATER SUPPLY CORP	Cameron	995.71	23	1
855	TOWN OF PRIMERA	Cameron	400	23	1
865	BROWNSVILLE PUBLIC UTIL BOARD	Cameron	29285.111	23	1
1980	BROWNSVILLE PUBLIC UTIL BOARD	Cameron	40000	23	1
3269	U S IMMIGRATION-NATURALIZATION	Cameron	268	23	1
4548	BAYVIEW IRR DIST 11	Cameron	45	22	1
5127	LAGUNA MADRE WATER DISTRICT	Cameron	180	22	1
240	NORTH ALAMO WSC	Hidalgo	5991.17	23	1
240	NORTH ALAMO WSC	Hidalgo	260	23	1
284	MILITARY HIGHWAY WSC	Hidalgo	164	23	1
285	MILITARY HIGHWAY WSC	Hidalgo	260	23	1
286	MILITARY HIGHWAY WSC	Hidalgo	66	23	1
339	RIO WSC	Hidalgo	200	23	1
353	MCALLEN, CITY OF	Hidalgo	678.84	23	1
461	NORTH ALAMO WSC	Hidalgo	3750	23	1
521	LA JOYA WSC	Hidalgo	250	23	1
543	HIDALGO COUNTY MUD NO. 1	Hidalgo	84.0425	23	1

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
582	FALCON RURAL WSC	Hidalgo	85	23	1
582	RIO WSC	Hidalgo	79	23	1
801	CITY OF EDINBURG	Hidalgo	2591.32	23	1
802	HIDALGO COUNTY IRR DIST 16	Hidalgo	1500	23	1
803	LA FERIA ID CAMERON CO 3	Hidalgo	1800	23	1
803	LA FERIA ID CAMERON CO 3	Hidalgo	900	23	1
803	LA FERIA ID CAMERON CO 3	Hidalgo	300	23	1
805	DONNA ID HIDALGO CO 1	Hidalgo	4190	23	1
806	CITY OF MISSION	Hidalgo	1169.54	23	1
808	HIDALGO CO IRR DIST 2	Hidalgo	11777.5	23	1
808	CITY OF PHARR	Hidalgo	1764	23	1
808	NORTH ALAMO WSC	Hidalgo	1198	23	1
809	ENGLEMAN IRRIGATION DISTRICT	Hidalgo	518.475	23	1
809	PALM VALLEY EST UTILITY DIST	Hidalgo	312.5	23	1
809	SHARYLAND WSC	Hidalgo	5583.4783	23	1
809	SHARYLAND WSC	Hidalgo	566.158	23	1
811	DELTA LAKE IRR DIST	Hidalgo	610	23	1
811	DELTA LAKE IRR DIST	Hidalgo	600	23	1
811	DELTA LAKE IRR DIST	Hidalgo	5670	23	1
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	1500	23	1
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	2580	23	1
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	5240	23	1
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	1340	23	1
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	1840	23	1
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	500	23	1
816	HIDALGO CO IRR DIST 1	Hidalgo	5390	23	1
816	HIDALGO CO IRR DIST 1	Hidalgo	625	23	1
821	CITY OF LYFORD	Hidalgo		23	1
823	MERCEDES, CITY OF	Hidalgo	1015	23	1
824	CITY OF WESLACO	Hidalgo	736.25	23	1
828	HIDALGO CO IRR DIST NO 6	Hidalgo	5816	23	1
828	CITY OF MISSION	Hidalgo	1250	23	1
833	HIDALGO CO MUD 1	Hidalgo	300	23	1
835	CALPINE CONSTR FINANCE CO LP	Hidalgo	250	23	1
846	UNITED IRRIGATION DISTRICT	Hidalgo	5000	23	1
846	UNITED IRRIGATION DISTRICT	Hidalgo	8125	23	1
846	UNITED IRRIGATION DISTRICT	Hidalgo	1190	23	1
848	HIDALGO CO WID 3	Hidalgo	5000	23	1
848	HIDALGO CO WID 3	Hidalgo	8980	23	1
849	UNITED IRRIGATION DISTRICT	Hidalgo	5300	23	1
852	TOWN OF LA BLANCA	Hidalgo	12.5	23	1
857	TOWN OF HIDALGO	Hidalgo	12.5	23	1
858	TOWN OF LOS EBANOS	Hidalgo	12.5	23	1
859	TOWN OF SULLIVAN CITY	Hidalgo	12.5	23	1
860	TOWN OF PENITAS	Hidalgo	12.5	23	1
864	VILLAGE OF LA JOYA	Hidalgo	12.5	23	1
873	CITY OF SAN JUAN	Hidalgo	316.275	23	1
874	CITY OF PHARR	Hidalgo	1083.88	23	1
3268	U S DEPT AGRI - ANIMAL & PLANT	Hidalgo	100	23	1
3998	CITY OF EAGLE PASS	Maverick	7707.4252	23	1
108	UNION WSC	Starr	75.5	23	1
232	UNION WSC	Starr	100	23	1

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
251	UNION WSC	Starr	125	23	1
284	UNION WSC	Starr	51.25	23	1
339	RIO WSC	Starr		23	1
521	LA JOYA WSC	Starr		23	1
603	FALCON RURAL WSC	Starr	10	23	1
640	UNION WATER SUPPLY CORP	Starr	79.49	23	1
646	FALCON RURAL WSC	Starr	10	23	1
673	FALCON RURAL WSC	Starr	20	23	1
675	FALCON RURAL WSC	Starr	14	23	1
699	FALCON RURAL WSC	Starr	25	23	1
730	CITY OF ROMA	Starr	7.38	23	1
814	CITY OF ROMA	Starr	2833.8	23	1
851	STARR CO WCID 2 MUD	Starr	2982.606	23	1
861	TOWN OF FRONTON	Starr	12.5	23	1
862	TOWN OF GARCENO	Starr	12.5	23	1
863	CITY OF LA GRULLA	Starr	522.0532	23	1
2428	A C DURIVAGE ET UX	Webb	0.5	23	1
2435	CLARENCE HOLT ET UX	Webb	0.5	23	1
2720	COUNTY OF WEBB	Webb	307	23	1
2720	COUNTY OF WEBB	Webb	2004.067	23	1
3997	LAREDO, CITY OF	Webb	42711.2138	23	1
3997	LAREDO, CITY OF	Webb		23	1
3997	LAREDO, CITY OF	Webb		23	1
3997	LAREDO, CITY OF	Webb	3325.875	23	1
7	PORT MANSFIELD PUD	Willacy	50	23	1
7	LEONEL BAZAN	Willacy	23.2	23	1
32	SUNNYDEW W S C	Willacy	4	23	1
138	SUNNYDEW WATER SUPPLY CORP	Willacy	50	23	1
201	PORT MANSFIELD PUD	Willacy	100	23	1
201	WILLACY CO NAVIGATION DIST	Willacy	100	23	1
461	NORTH ALAMO WSC	Willacy		23	1
248	MARY JANE COX GREEN	Zapata	5.5	23	1
339	RIO WSC	Zapata		23	1
346	SIESTA SHORES WCID	Zapata	165	23	1
461	SIESTA SHORES INC	Zapata	62.5	23	1
803	ZAPATA CO WCID	Zapata	105	23	1
2423	ALBERT J LONG	Zapata	0.5	23	1
2426	DONALD L HAYES	Zapata	0.5	23	1
2426	LENDOL C BARKER	Zapata	0.5	23	1
2430	RICHARD GARZA ET UX	Zapata	1	23	1
2719	HOWARD R LIETZ ET UX	Zapata	5	23	1
2752	FAR POINT ESTATE	Zapata	3	23	1
2785	SAN YGNACIO MUD	Zapata	233.75	23	1
2801	BEULAH M BALLARD	Zapata	9.5	23	1
2801	ORVILLE BALLARD	Zapata	0.5	23	1
2803	DELUXE HOMES INC	Zapata	4	23	1
2804	ZAPATA COUNTY WATER WORKS	Zapata	1784.2	23	1
2806	ZAPATA COUNTY WATER WORKS	Zapata	16	23	1
2807	JAMES W. WOLFE	Zapata	3	23	1
2808	DAVID G DELORME ET UX	Zapata	7.7	23	1
2809	DAVID G DELORME ET UX	Zapata	8	23	1
2810	JUAN A GUEVARA ET UX	Zapata	1	23	1

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
3270	INTERNATL BOUNDARY & WTR COMM	Zapata	150	23	1
625	ARROYO WSC	Cameron		23	2
829	CAMERON CO IRR DIST NO 6	Cameron	20	23	2
838	EAST RIO HONDO WSC	Cameron		23	2
841	CAMERON CO IRR DIST NO 2	Cameron	2400	23	2
854	OLMITO WATER SUPPLY CORP	Cameron		23	2
865	BROWNSVILLE PUBLIC UTIL BOARD	Cameron		23	2
1980	BROWNSVILLE PUBLIC UTIL BOARD	Cameron		23	2
4550	HARLINGEN SHRIMP FARMS LTD	Cameron	35970	22	2
5254	CITY OF HARLINGEN	Cameron	2240	22	2
27	AEP TEXAS CENTRAL COMPANY	Hidalgo	600	23	2
294	AEP TEXAS CENTRAL COMPANY	Hidalgo	375	23	2
313	HIDALGO, COUNTY OF	Hidalgo	15.255	23	2
806	CITY OF MISSION	Hidalgo		23	2
807	VALLEY ACRES IRRIGATION DIST	Hidalgo	200	23	2
808	HIDALGO CO IRR DIST 2	Hidalgo	13273	23	2
809	SHARYLAND WSC	Hidalgo		23	2
816	HIDALGO CO IRR DIST 1	Hidalgo		23	2
816	HIDALGO CO IRR DIST 1	Hidalgo		23	2
828	HIDALGO CO IRR DIST NO 6	Hidalgo		23	2
835	CALPINE CONSTR FINANCE CO LP	Hidalgo		23	2
841	AEP TEXAS CENTRAL COMPANY	Hidalgo	1500	23	2
844	TEXAS DEPT OF TRANSPORTATION	Hidalgo	2124.253	23	2
846	UNITED IRRIGATION DISTRICT	Hidalgo		23	2
846	UNITED IRRIGATION DISTRICT	Hidalgo		23	2
870	TEXAS PLASTICS INC	Hidalgo	100	23	2
3268	U S DEPT AGRI - ANIMAL & PLANT	Hidalgo	500	23	2
4520	VALLEY ACRES IRRIGATION DIST	Hidalgo	300	22	2
116	DOS REPUBLICAS COAL PARTNERSHP	Maverick	113.62	23	2
2720	COUNTY OF WEBB	Webb		23	2
2727	AEP TEXAS CENTRAL COMPANY	Webb	1644.5	23	2
2727	AEP TEXAS CENTRAL COMPANY	Webb		23	2
3997	LAREDO, CITY OF	Webb		23	2
4533	TEXAS UNITED FISHERIES INC	Willacy	3250	22	2
10	EL SABINO INC	Cameron	368.415	23	3
12	PLAYA DEL RIO INC	Cameron	162.5	23	3
14	JAMES S BENSON	Cameron	150	23	3
19	JOE DAVIS BALLENGER	Cameron	98.75	23	3
20	EZEQUIEL CORTEZ	Cameron	1.804	23	3
20	RAUL C CORTEZ	Cameron	17.198	23	3
20	JOSE A GOMEZ ET AL	Cameron	12.048	23	3
20	CARLOS MARTINEZ ET UX	Cameron	0.798	23	3
20	SANTIAGO CORTEZ ET UX	Cameron	1.382	23	3
20	MID-STATE HOMES INC	Cameron	0.381	23	3
20	PEDRO CORTEZ ET UX	Cameron	0.444	23	3
20	JOSE A CORTEZ ET UX	Cameron	0.635	23	3
20	JUAN FRANCISCO RUIZ ET UX	Cameron	19.103	23	3
20	ROBERTA S CISNEROS	Cameron	13.81	23	3
20	ENRIQUE PENA	Cameron	16.201	23	3
20	DAVID CHARLES HINKEL ET UX	Cameron	16.201	23	3
20	ELISEO RUIZ ET UX	Cameron	25.854	23	3
20	STEPHEN G FIEDLER ET UX	Cameron	12.047	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
20	JOSE CARDENAS	Cameron	12.048	23	3
20	ROMULO CASTILLO ET UX	Cameron	13.807	23	3
20	PEDRO A LOPEZ	Cameron	13.972	23	3
20	BOONE LA GRANGE	Cameron	13.813	23	3
20	ERNESTO S DAVILA DDS	Cameron	16.204	23	3
20	DANIEL GUSTAFSON	Cameron	6.675	23	3
21	ANTONIO M DIAZ JR	Cameron	87.675	23	3
22	EDUARDO BENAVIDES	Cameron	63.5	23	3
24	CHARLES SHOFNER	Cameron	1630	23	3
25	ESTATE OF RUBY O BENSON	Cameron	1036	23	3
29	MIGUEL A ORTIZ ET AL	Cameron	335	23	3
30	TERESA C GUERRA RESIDUARY TRST	Cameron	362.5	23	3
31	ALFREDO CANTU ET AL	Cameron	17.75	23	3
32	JESUS M CASTELLANO ET UX	Cameron	64.1	23	3
33	CARLOS ALONZO LOZANO ET AL	Cameron	283.863	23	3
33	RAUL TIJERINA JR ET AL	Cameron	190.487	23	3
34	F D CATHCART III	Cameron	275	23	3
35	TOMAS GARCIA ET UX	Cameron	153.488	23	3
35	JESUS A ZAVALETA ET UX	Cameron	153.488	23	3
35	ADRIANNA LAURA GARCIA ET AL	Cameron	76.744	23	3
35	VIDAL LONGORIA MD	Cameron	31.28	23	3
36	JESUS CASTELLANO	Cameron	111.312	23	3
36	MANUELA CAVAZOS ESCAMILLA	Cameron	14.344	23	3
36	JOSEFA CAVAZOS MONTEMAYOR	Cameron	8.606	23	3
37	MADEIRA PROPERTIES LTD	Cameron	231.25	23	3
38	SAUL FRED GARZA	Cameron	1.775	23	3
38	ROEL R RODRIGUEZ	Cameron	1.775	23	3
39	LEONEL GARZA JR ET AL	Cameron	95	23	3
40	RAUL CAVAZOS	Cameron	425	23	3
42	LA GRULLA, CITY OF	Cameron	32.775	23	3
42	ESTATE OF HOWARD K CUMMINS	Cameron	1.9	23	3
44	ROMEO R ESPARZA	Cameron	372.17	23	3
44	MARIA GUADALUPE OCAMPO ESPARZA	Cameron	87.345	23	3
46	SERVANDO DE LA GARZA	Cameron	52.5	23	3
47	MARIA DEL SOCORRO H DEL BOSQUE	Cameron	21.3	23	3
48	MATEO CORTEZ JR	Cameron	40	23	3
49	BELIA R COY ET AL	Cameron	112.5	23	3
51	CAMERON CO IRR DIST 2	Cameron	13.725	23	3
52	ARNOLDO GEORGE	Cameron	13.125	23	3
54	ESPERANZA G DE LA ROSA ET VIR	Cameron	70	23	3
55	ESTATE OF AMELIA VERA DE LEON	Cameron	17.5	23	3
56	ESTATE OF AMELIA VERA DE LEON	Cameron	225	23	3
57	ESTATE OF AMELIA VERA DE LEON	Cameron	55	23	3
58	AMELIA V DE LEON	Cameron	200	23	3
59	AMELIA V DE LEON	Cameron	150	23	3
62	MANUEL DOMINGUEZ	Cameron	9.25	23	3
63	FRANCIS L PHILLIPP ET UX	Cameron	229.475	23	3
64	ALBERTO G GARZA JR ET UX	Cameron	125	23	3
65	THELMA A DAWSON	Cameron	1829.825	23	3
65	THELMA A DAWSON TRUSTEE	Cameron	45.175	23	3
66	ENCANTADA FARMING INTERESTS INC	Cameron	182.95	23	3
66	ALBERTO G GARZA JR ET UX	Cameron	71.75	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
67	JOSE M ESCAMILLA ET AL	Cameron	30.14	23	3
67	RENE L ESCAMILLA	Cameron	28.85	23	3
68	LIEVEN J VAN RIET	Cameron	28.894	23	3
68	J D ESPARZA	Cameron	69.731	23	3
69	THE NATURE CONSERVANCY	Cameron	50	23	3
71	ISRAEL LIZKA ET AL	Cameron	297.5	23	3
72	RICARDO ORTIZ	Cameron	116.714	23	3
72	MIGUEL A ORTIZ	Cameron	383.7875	23	3
72	MIGUEL ORTIZ ET UX	Cameron	133.7875	23	3
72	VALLEY MUD #2	Cameron	6011.25	23	3
72	FREEDOM PROPERTIES OF TX INC	Cameron	315.85	23	3
73	RICARDO ORTIZ	Cameron	217.862	23	3
73	MIGUEL A ORTIZ	Cameron	655.4125	23	3
73	MIGUEL A ORTIZ ET UX	Cameron	318.6365	23	3
73	VALLEY MUNICIPAL UTILITY DISTRICT NO 2	Cameron	91.375	23	3
75	THE NATURE CONSERVANCY	Cameron	240.375	23	3
75	THE NATURE CONSERVANCY	Cameron	18.625	23	3
76	ESTATE OF ENRIQUE GALVAN	Cameron	236.2	23	3
77	J A GARCIA JR ET AL	Cameron	107.5	23	3
78	AMELIA LONGORIA ET AL	Cameron	13.175	23	3
78	RICARDO EVERETT ET AL	Cameron	17.625	23	3
79	HORACIO GARCIA	Cameron	40	23	3
80	LUCINDA GARCIA ET AL	Cameron	205	23	3
80	OMADEE BARTON GARCIA ET AL	Cameron		23	3
80	JOSE GUADALUPE GARCIA ET AL	Cameron		23	3
82	JORGE J GARCIA ET UX	Cameron	62.5	23	3
83	JORGE J GARCIA ET UX	Cameron	62.5	23	3
84	RAMIRO S GARCIA ET UX	Cameron	45	23	3
85	ABELARDO RIVERA ET AL	Cameron	62.5	23	3
87	JESUS GARZA	Cameron	68.77	23	3
87	BELEN GARZA CAVAZOS ET VIR	Cameron	5.83	23	3
87	IDOLINA GARZA WEAVER ET VIR	Cameron	4.3	23	3
87	VALERIANO HERNANDEZ	Cameron	4.3	23	3
87	GONZALO GARZA	Cameron	4.3	23	3
88	MARIA LINDA GARZA	Cameron	22	23	3
89	FIRST ORO MANAGEMENT INC	Cameron	387.5	23	3
90	EDUARDO GAVITO ET AL	Cameron	312.5	23	3
90	PATRICIA NYE HARDING ET AL	Cameron	150	23	3
91	JOSEFA T CASTELLANO	Cameron	49.76	23	3
91	LEAL'S FARM INC	Cameron	196.74	23	3
92	PAUL ALEXANDER WEAVER JR	Cameron	12.5	23	3
96	GLOOR DEVELOPMENT CORP	Cameron	49.25	23	3
97	MARIA COY DE GOMEZ	Cameron	77.5	23	3
98	JUAN FERMIN LEAL ET AL	Cameron	35	23	3
100	MARIA COY GOMEZ ET AL	Cameron	87.5	23	3
101	JOHN BECKER TRUSTEE	Cameron	247.5	23	3
103	CAYETANO GONZALEZ	Cameron	37.5	23	3
105	PINE TREE CONSERVATION SOCIETY	Cameron	547.5	23	3
106	EST OF WALTER M JEFFORDS JR ET AL CO-TI	Cameron	1975	23	3
107	DULANEY FARMS LTD	Cameron	250	23	3
109	CHARLES L SHOFNER	Cameron	375	23	3
111	HERBERT M WILLIAMS TRUSTEE	Cameron	8.1265	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
111	JOSE G GARZA ET UX	Cameron	26.4565	23	3
111	GRACE SUMMERFIELD-KLINKHAMER	Cameron	2.077	23	3
114	LUISA P LEAL ET AL	Cameron	62.5	23	3
115	LLOYD E HORN ET UX	Cameron	65	23	3
117	RANKIN COMPANY	Cameron	125	23	3
117	GHONSHAM SOOKNANDAN	Cameron		23	3
117	WALTER L BEEGLE ET UX	Cameron		23	3
119	KINCANNON FARMS PARTNERSHIP	Cameron	1493.75	23	3
120	PLAYA WSC	Cameron	115	23	3
121	ROBERT C WELLS	Cameron	105	23	3
123	ESTATE OF MARGARET D HOLLON ET AL	Cameron	232.88	23	3
123	ROBERT R MATHERS	Cameron		23	3
123	WORLD RADIO MISSIONARY FELLOWSHIP INC	Cameron	7.32	23	3
126	U S FISH & WILDLIFE SERVICE	Cameron	19837.0886	23	3
126	U S FISH & WILDLIFE SERVICE	Cameron	1848.365	23	3
127	VIDAL LONGORIA	Cameron	187.5	23	3
130	VIDAL LONGORIA	Cameron	192.5	23	3
131	JOSE LOPEZ	Cameron	139.75	23	3
135	MATHERS BROTHERS FARMS INC	Cameron	1127.835	23	3
137	NCNB TEXAS NATIONAL BANK	Cameron	50	23	3
137	F E BUTLER TRUSTEE	Cameron	150	23	3
139	WALTER M JEFFORDS JR EST ET AL	Cameron	187.5	23	3
139	WALTER M JEFFORDS JR ESTATE	Cameron	62.5	23	3
139	BRADLEY NORDYKE ET UX	Cameron	187.02	23	3
140	GLORIA SAENZ	Cameron	212.5	23	3
141	WALTER M JEFFORDS JR ESTATE	Cameron	591.6675	23	3
141	TEXAS PARKS & WILDLIFE DEPT	Cameron	295.8325	23	3
142	UNVERIFIED OWNERS,OTHER AMTS COMBINE	Cameron	6.3405	23	3
144	UNITED STATES DEPT OF INTERIOR	Cameron	31.1041	23	3
144	RICKARD PAUL EKSTROM ET UX	Cameron	18.8959	23	3
145	ESTATE OF WALTER M JEFFORDS JR	Cameron	1018	23	3
147	UNITED STATES DEPT OF INTERIOR	Cameron	12.9	23	3
148	BERNADETTE M OESER	Cameron	52.5	23	3
149	JOAQUIN ALMAZAN	Cameron	21.25	23	3
150	GREGORIO TORRES ET AL	Cameron	2.5	23	3
151	VISTA DEL MAR IRRIGATION CO	Cameron	7.5	23	3
152	EUFEMIA C ORIVE	Cameron	11.05	23	3
153	MADEIRA PROPERTIES LTD	Cameron	375	23	3
154	ENRIQUE PENA	Cameron	25	23	3
156	UNITED STATES DEPT OF INTERIOR	Cameron	51.5	23	3
156	DE ESTHER BRABANT ET AL	Cameron	11	23	3
159	MARIA T POPE ET AL	Cameron	387.5	23	3
160	ESTATE OF ALBERTO EUGENIO ROCK	Cameron	75	23	3
163	THE NATURE CONSERVANCY	Cameron	690	23	3
166	GONZALES FAMILY PARTNERSHIP	Cameron	82.5	23	3
167	ABEL GONZALES DBA/G&T PAVING COMPANY	Cameron	110	23	3
169	UNITED STATES DEPT OF INTERIOR	Cameron	125	23	3
170	ALBERTO GARZA JR	Cameron	23	23	3
170	JORGE LUIS RODRIGUEZ	Cameron	2	23	3
171	ARNOLDO GEORGE	Cameron	35.725	23	3
172	ESTATE OF WALTER M JEFFORDS JR	Cameron	250	23	3
173	LAVERNE SUMNER ET UX	Cameron	200	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
174	ROBERT MATHERS	Cameron	344.725	23	3
174	JOSE ANTONIO NEGRETE	Cameron	74.75	23	3
175	LAVERNE SUMNER ET UX	Cameron	225	23	3
176	GREGORY P SCHREIBER ET UX	Cameron	80	23	3
177	KENNETH K SHIMOTSU ET UX	Cameron	95	23	3
179	LOUISE SMITH ET AL	Cameron	35	23	3
180	ROBERT MATHERS	Cameron	132.5	23	3
182	EDMUNDO SOSA	Cameron	50	23	3
183	THE NATURE CONSERVANCY	Cameron	480.025	23	3
184	JESUS QUINTANILLA JR	Cameron	119.83	23	3
186	MANUEL A TAMEZ	Cameron	14.75	23	3
187	VIDAL LONGORIA	Cameron	118.3	23	3
188	MITSUYE TANAMACHI TRUSTEE	Cameron	17.5	23	3
189	HARRY H SHIMOTSU ET UX	Cameron	1242.5	23	3
190	E D PALMER ET UX	Cameron	65.575	23	3
192	MARIA ALICE T SANCHEZ	Cameron	41.67	23	3
193	RAUL TIJERINA SR ET AL	Cameron	257.5	23	3
195	ADELA T TATUM	Cameron	57.19	23	3
196	NINFA T GARCIA ET AL	Cameron	12.9	23	3
197	NINFA T GARCIA ET AL	Cameron	12.9	23	3
198	GERTRUDIS G TREVINO ET AL	Cameron	37.5	23	3
199	JOSE I TREVINO ET AL	Cameron	217.5	23	3
203	JESSE L VAN WINKLE	Cameron	80	23	3
204	GAYLE CAMPBELL TRUSTEE	Cameron	62.5	23	3
205	GENEVIEVE VAUGHAN	Cameron	64.075	23	3
205	NATIONAL AUDUBON SOCIETY INC	Cameron	1185.925	23	3
206	JUAN F LEAL ET AL	Cameron	225	23	3
207	GLOOR DEVELOPMENT CORP	Cameron	0.75	23	3
208	WILLIAM A FAULK	Cameron	38.18	23	3
209	BRENDA E WATERS TRUSTEE	Cameron	360	23	3
210	L & L FARMS	Cameron	325	23	3
210	BORZYNSKI BROTHERS	Cameron	175	23	3
212	JOE ROY WEAVER	Cameron	12.5	23	3
213	SAM R SPARKS INC	Cameron	887.7563	23	3
213	SAM R SPARKS INC	Cameron	3199.875	23	3
214	MANUEL WEAVER	Cameron	10	23	3
217	ESTATE OF CATARINA W CAVAZOS	Cameron	8.03	23	3
218	JAIME MARTINEZ ET AL	Cameron	21.25	23	3
218	TONY WEAVER ET UX	Cameron	24	23	3
219	D & D FARMS	Cameron	26.725	23	3
220	MILTON K WEIKEL ET AL	Cameron	400	23	3
221	ROBERT C WELLS	Cameron	535.325	23	3
221	MICHAEL F SCAIEF	Cameron	75	23	3
222	JAY LARRY WELLS ET AL	Cameron	153.425	23	3
224	JAMES ALEXANDER WELLS ET AL	Cameron	20	23	3
225	MILTON E WENTZ SR ET UX	Cameron	500	23	3
226	DULANEY FARMS LTD	Cameron	1000	23	3
231	DAVID A HANAWA ET AL	Cameron	20	23	3
232	WILLIAM A FAULK TRUSTEE	Cameron	250	23	3
234	ALBERTO ZEPEDA ET AL	Cameron	175	23	3
235	CARLOS E ZEPEDA JR ET UX	Cameron	100	23	3
236	PEDRO ZEPEDA	Cameron	4.81	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
236	ROY ZEPEDA ET AL	Cameron	26.14	23	3
239	JUDITH ANN FOLEY PRUKOP	Cameron	14.1	23	3
239	GAYLE CAMPBELL TRUSTEE	Cameron	10	23	3
241	MICHAEL FREDERICK BARREDA ET UX	Cameron	37.5	23	3
243	DIANA INEZ SANTISO DEL RIO	Cameron	920.9875	23	3
244	LAURA WOLF BAUER	Cameron	292.5	23	3
249	ESTATE OF RUBY O BENSON	Cameron	197.5	23	3
251	AGNES O BROWNE TRUSTEE ET AL	Cameron	490	23	3
252	AGNES O BROWNE TRUSTEE ET AL	Cameron	269.588	23	3
254	RITA FAY SCHRIEBER	Cameron	175.05	23	3
257	CITY OF ROMA	Cameron	112.5	23	3
258	CITY OF ROMA	Cameron	235.75	23	3
259	LEE R STEVENS	Cameron	7.5	23	3
260	CITY OF ROMA	Cameron	212.5	23	3
261	CITY OF RIO GRANDE	Cameron	45.78	23	3
261	RICARDO BALLI ET AL	Cameron	5.72	23	3
262	LUCIANO ORTIZ CANTU ET AL	Cameron	33.125	23	3
263	NORMAN D FLADOS ET UX	Cameron	253.925	23	3
263	DOLORES FLADOS	Cameron	253.925	23	3
263	SAN BENITO INTL BRIDGE CO	Cameron	17.15	23	3
264	SOLTEX DEVELOPMENT INC	Cameron	15	23	3
265	JUAN SOLIS JR ET AL	Cameron	11	23	3
265	SHARYLAND WSC	Cameron	117	23	3
266	KURTIS E HOPPERSTAD ET UX	Cameron	21.925	23	3
268	DULANEY FARMS LTD	Cameron	1000	23	3
270	ALEIDA GARCIA AGADO ET AL	Cameron	36.426	23	3
275	THE ESTATE OF FRANCISCO A GARCIA	Cameron	225	23	3
275	NORMAN FLADOS ET AL	Cameron	112.5	23	3
275	MILITARY HIGHWAY WSC	Cameron	22.5	23	3
276	CELIA E GARCIA	Cameron	1.7	23	3
276	JUAN GARCIA ET AL	Cameron	3.425	23	3
276	GUADALUPE GARCIA	Cameron	1.7	23	3
276	FRUCTUOSO GARCIA	Cameron	1.7	23	3
276	MARGARITA AND HUMBERTO GARCIA	Cameron	1.7	23	3
276	GUADALUPE GARCIA ET AL	Cameron	4.225	23	3
277	ESTATE OF MARIA T GARCIA	Cameron	35.69	23	3
277	SHARYLAND WSC	Cameron	83.32	23	3
277	GARZA & GARZA	Cameron	40.99	23	3
278	ELECTRIC GIN CO OF SAN BENITO	Cameron	132.5	23	3
279	EL RANCHO POTRERO DEV CO INC	Cameron	156.5	23	3
281	TEOFILO HECTOR FLORES JR ET UX	Cameron	106.375	23	3
282	JANET DWIRE MATHIS	Cameron	14.33	23	3
284	REINALDO SANTIAGO SANTISO	Cameron	240.2125	23	3
285	SOLTEX DEVELOPMENT INC	Cameron	125.55	23	3
285	SHARYLAND WSC	Cameron	8.675	23	3
285	ALFONSO CORTEZ	Cameron	1.95	23	3
285	LUCIO TORRES JR	Cameron	0.48	23	3
287	DONALD F PHILLIPP	Cameron	255.75	23	3
288	MARTHA M AND JAMES D RUSSELL	Cameron	9145.875	23	3
288	MADEIRA PROPERTIES LTD	Cameron	2654.125	23	3
289	REINALDO SANTIAGO SANTISO	Cameron	373.094	23	3
289	DIANA SANTISO DEL RIO	Cameron	348.094	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
289	RENE MALDONADO ET UX	Cameron	12.5	23	3
289	FERNANDO BECERRA ET UX	Cameron	1.34	23	3
290	STEVEN HUGH SHIMOTSU ET AL	Cameron	17.5	23	3
291	PAUL L SLADEK	Cameron	151.875	23	3
292	PAUL L SLADEK	Cameron	496.025	23	3
293	KO-MAR CONSTRUCTION CO INC	Cameron	153.7	23	3
295	ESTATE OF RAUL Z TREVINO ET AL	Cameron	70.17	23	3
296	CARL L BAUER ET AL	Cameron	959.215	23	3
297	CORONADO COMPANY LLC	Cameron	1492.25	23	3
315	PLAYA W S C	Cameron	119.475	23	3
415	MADEIRA PROPERTIES LTD	Cameron	326.3	23	3
817	SANTA MARIA ID CAMERON CO 4	Cameron	10182.5	23	3
829	CAMERON CO IRR DIST NO 6	Cameron	52141.925	23	3
831	HARLINGEN IRR DIST	Cameron	93857.5	23	3
831	HARLINGEN IRR DIST	Cameron	4375	23	3
834	CAMERON CO WID 10	Cameron	8587.5	23	3
834	CITY OF HARLINGEN WATERWORKS	Cameron	1625	23	3
835	BAYVIEW IRR DIST 11	Cameron	17478.025	23	3
838	CAMERON CO WID #16	Cameron	3712.5	23	3
839	LMB PARTNERSHIP LTD	Cameron	625	23	3
840	ADAMS GARDENS IRR DIST 19	Cameron	18737.655	23	3
841	CAMERON CO IRR DIST NO 2	Cameron	147823.65	23	3
843	BROWNSVILLE IRRIGATION DISTRICT	Cameron	33949.45	23	3
843	BROWNSVILLE IRRIGATION DISTRICT	Cameron	926.55	23	3
844	TEXAS DEPT OF TRANSPORTATION	Cameron		23	3
865	BROWNSVILLE PUBLIC UTIL BOARD	Cameron	1782.5	23	3
878	DR VIDAL LONGORIA	Cameron	287.5	23	3
1462	STUART DODDS SHOEMAKER	Cameron	300	22	3
3281	U S DEPT AGRICULTURE-SCI	Cameron	208	23	3
4360	LELAND L WESTPHALL	Cameron	117	23	3
4525	SPARKS FAMILY PARTNERSHIP LTD	Cameron	1080.68	22	3
4526	LA FERIA ID, CAMERON CO 3	Cameron	1806	22	3
4527	ADAMS GARDENS ID NO. 19	Cameron	50	22	3
4529	ALDEN N JOHNSON	Cameron	390	22	3
4530	PHILLIP OXFORD	Cameron	64.2	22	3
4534	JOHN A ABBOTT	Cameron	324.5	22	3
4535	PORT OF HARLINGEN AUTHORITY	Cameron	63.65	22	3
4537	HARLINGEN ID CAMERON CO NO 1	Cameron	3656	22	3
4540	CAMERON CO ID 2	Cameron		22	3
4541	JOSE LUIS SAENZ ET UX	Cameron	1560	22	3
4541	RUSSELL & TRACY LTD PARTNERSHIP	Cameron	1040	22	3
4542	CAMERON CO WCID 6	Cameron	2269.37	22	3
4544	MATT F GORGES	Cameron	728.35	22	3
4544	UNITED STATES DEPT OF INTERIOR	Cameron	771.65	22	3
4545	QUERENCIA LAND & CATTLE CO	Cameron	1225	22	3
4547	CAMERON CO WID 10	Cameron	300	22	3
4548	BAYVIEW IRR DIST 11	Cameron	1455	22	3
4549	DULANEY FARMS LTD	Cameron	3600	22	3
4552	CAMERON CO WID 16	Cameron	300	22	3
4553	UNITED STATES DEPT OF INTERIOR	Cameron	3459	22	3
4554	BROWNSVILLE IRR & DRAIN DIST	Cameron	1200	22	3
5004	RUSSELL PLANTATION LT PARTNER	Cameron	300	22	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
5011	MILTON E WENTZ JR ET AL	Cameron	1100	22	3
5040	LMB CORPORATION	Cameron	395	22	3
5135	VALLEY MUD 2	Cameron	165	22	3
5212	STUART DODDS SHOEMAKER	Cameron	3	22	3
248	GAYLE CAMPBELL TRUSTEE	Hidalgo	11	23	3
248	JESSE RAY RUSSELL PARTNERSHIP	Hidalgo	11	23	3
248	EDUARDO GONZALEZ	Hidalgo	11	23	3
248	JULIE G UHLHORN EXEC & TRUSTEE	Hidalgo	375	23	3
294	FELIPE GALVAN TRUSTEE	Hidalgo	250	23	3
301	ESTATE OF WILLIAM HENRY DRAWE	Hidalgo	128.25	23	3
301	ESTATE OF WILLIAM HENRY DRAWE	Hidalgo	857.5	23	3
302	CITY OF HIDALGO	Hidalgo	311.25	23	3
302	HIDALGO CO IRR DIST NO 2	Hidalgo	9.086	23	3
303	ROBERT S KENT ET UX	Hidalgo	228.75	23	3
303	EL PACIFICO LTD	Hidalgo	137.75	23	3
304	DANIEL E ARNOLD	Hidalgo	338.225	23	3
310	CLIFFORD L KLINCK III	Hidalgo	41.9	23	3
311	MARIA GUADALUPE HERNANDEZ	Hidalgo	17.5	23	3
312	B D SPILLAR ET UX	Hidalgo	11.25	23	3
312	LMB CORPORATION	Hidalgo	24.07	23	3
312	TEXAS DEPT OF TRANSPORTATION	Hidalgo	2.017	23	3
312	GMCFJS (GM CADLE & FJ SMITH)	Hidalgo	43.813	23	3
314	NORTH WARE ROAD INVESTMENT GRP	Hidalgo	482.5	23	3
316	J C TREVINO JR	Hidalgo	95	23	3
317	RIVER FARMS PARTNERSHIP	Hidalgo	1325	23	3
318	MOORE & SONS FARMS INC ET AL	Hidalgo	500.175	23	3
319	LA JOYA WSC	Hidalgo	0.575	23	3
319	PABLO TREVINO ET UX	Hidalgo	61.975	23	3
319	PABLO TREVINO ET UX	Hidalgo	62.95	23	3
319	HEATH, STUART & SCHNEIDER INC	Hidalgo	49.433	23	3
319	PORFIRIO TIJERINA JR ET UX	Hidalgo	25.342	23	3
319	PORFIRIO TIJERINA JR ET UX	Hidalgo	12.879	23	3
319	HARSHA PUTTAGUNTA ET UX	Hidalgo	18.6	23	3
319	TOMAS CEDILLO JR ET UX	Hidalgo	9.8	23	3
319	RODOLFO TREVINO ET UX	Hidalgo	10.725	23	3
319	LEONEL BAZAN	Hidalgo	12.525	23	3
319	ROBERT C ETTINGER	Hidalgo	12.525	23	3
319	DONALD P SOBOCINSKI ET AL	Hidalgo	12.525	23	3
319	EMERALD BAY CORPORATION	Hidalgo	12.745	23	3
319	RICK MARTIN	Hidalgo	49.105	23	3
319	RICHARD A GARZA	Hidalgo	12.6	23	3
319	HOMER WELLS	Hidalgo	12.425	23	3
319	REV. JOHN J FISHER	Hidalgo	15.75	23	3
319	ST. LOMITA GROVE COMPANY	Hidalgo	12.7	23	3
319	RICHARD A MARTIN ET UX	Hidalgo	25.2	23	3
328	ALEJANDRO PEREZ ET UX	Hidalgo	1.525	23	3
332	SHARYLAND CORPORATION	Hidalgo	2592.125	23	3
332	SHARYLAND CORPORATION	Hidalgo	330.7	23	3
333	MONICA RIVERA	Hidalgo	0.75	23	3
333	VALENTIN TREVINO GARCIA	Hidalgo	0.8	23	3
333	ISMAEL VELA	Hidalgo	0.55	23	3
335	ALMA P ALANIZ	Hidalgo	2.3	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
335	CALIXTO RIVERA ET UX	Hidalgo	10	23	3
336	LUIS D ALVAREZ	Hidalgo	27.5	23	3
337	TEJAS LAND & CATTLE CO	Hidalgo	590.187	23	3
338	TEXAS PARKS & WILDLIFE DEPT	Hidalgo	255	23	3
339	RUFINO GARZA ET AL	Hidalgo	937.5	23	3
340	RANDALL LANCE BARNES	Hidalgo	702.8	23	3
345	ART W BECKWITH ET UX	Hidalgo	500	23	3
346	GERALD E BELL ET AL	Hidalgo	1047.75	23	3
346	BELL GRAIN INC	Hidalgo	112.5	23	3
349	W G BELL JR	Hidalgo	1875	23	3
349	CONLY BELL TRUSTEE	Hidalgo		23	3
349	W G BELL JR	Hidalgo	216.375	23	3
349	CONLY BELL TRUSTEE	Hidalgo		23	3
351	BALLARD BENNETT	Hidalgo	300	23	3
352	MICHAELENE E KUBY ET AL	Hidalgo	87.5	23	3
353	MCALLEN TRADE ZONE INC	Hidalgo	50	23	3
355	OTTO BOEHMER ET UX	Hidalgo	50	23	3
356	DORA B RODRIQUEZ ET AL	Hidalgo	107.5	23	3
359	SAM J BREWSTER TRUSTEE	Hidalgo	65	23	3
361	ESTATE OF E F DAVIS JR	Hidalgo	250	23	3
362	DON BURRHUS	Hidalgo	42.5	23	3
363	OTTO BOEHMER ET UX	Hidalgo	75	23	3
364	SHARYLAND CORPORATION	Hidalgo	30	23	3
365	JOSE CANTU ET AL	Hidalgo	44.225	23	3
365	DAVID A DAVILA	Hidalgo	30.35	23	3
365	ESTATE OF ANGELITA CANTU DE LOZANO	Hidalgo	12.1	23	3
366	TROPHY INTERNATIONAL INC	Hidalgo	30.275	23	3
367	MRS OLETA CARPENTER	Hidalgo	500	23	3
370	JOSE ALFREDO CAVAZOS ET AL	Hidalgo	162.5	23	3
372	OFELIA D CHAPA	Hidalgo	75	23	3
373	CONCEPCION CHAPA ESTATE	Hidalgo	27.5	23	3
374	MARIO CHAPA	Hidalgo	52.5	23	3
377	BLANCA CHAPA PINNER	Hidalgo	6.48	23	3
377	BLANCA CHAPA PINNER ET VIR	Hidalgo	13.5	23	3
377	TRUSTEE OF THE RAFAELA G CHAPA TRUST	Hidalgo	8.8	23	3
377	OCTAVIO A CHAPA	Hidalgo	8.8	23	3
377	ALBERTO X CHAPA	Hidalgo	8.8	23	3
377	ALBERTO X CHAPA ET UX	Hidalgo	2.32	23	3
378	MARTHA L C DE LORENZO ET AL	Hidalgo	63	23	3
379	TELESFORO CISNEROS SR	Hidalgo	4.5	23	3
380	TELESFORO CISNEROS JR	Hidalgo	4.475	23	3
381	RIO PROPERTIES INC	Hidalgo	232.45	23	3
383	CAPOTE FARMS INC	Hidalgo	550	23	3
386	HIROCHI J DATE ET AL	Hidalgo	75	23	3
389	JOSE DE LA FUENTE ET AL	Hidalgo	25	23	3
393	ESTEBAN DE LA ROSA ET AL	Hidalgo	32.5	23	3
394	AMELIA V DE LEON	Hidalgo	75	23	3
399	CHARLES E PRATT ET AL	Hidalgo	1990.235	23	3
399	CHARLES E PRATT ET AL	Hidalgo	575	23	3
399	CLUB MARK CORPORATION	Hidalgo	225	23	3
400	DIXIE MORTGAGE LOAN CO	Hidalgo	29.1	23	3
400	DIXIE MORTGAGE LOAN CO ET AL	Hidalgo	96.325	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
400	COLLECTING BANK NA	Hidalgo	32.9805	23	3
400	SHIN FOUNDATION I LTD	Hidalgo	499.51	23	3
401	JOSEPHINE DOFFING	Hidalgo	625	23	3
402	ARLENE LUNA	Hidalgo	12.5	23	3
403	SHARON BOEHMER	Hidalgo	12.5	23	3
404	GENEVIEVE T DOUGHERTY TR #2	Hidalgo	20	23	3
408	MAY DOUGHERTY KING ET AL	Hidalgo	87.5	23	3
410	ESTATE OF JAMES R DOUGHERTY III	Hidalgo	179.75	23	3
411	EDINBURG IMPROVEMENT ASSN	Hidalgo	712.5	23	3
411	EDINBURG IMPROVEMENT ASSN	Hidalgo	70	23	3
412	EDINBURG FOUNDATION INC	Hidalgo	86	23	3
412	JAMES P HOFFMAN	Hidalgo	34	23	3
413	ELENA S MONTALVO	Hidalgo	65	23	3
414	O D EMERY JR ET AL	Hidalgo	582.5	23	3
415	BILL BURNS	Hidalgo	3155.3	23	3
416	LUTHER E BRADFORD ET UX	Hidalgo	215.9125	23	3
418	JAMES L PAWLIK ET AL	Hidalgo	732.5	23	3
419	HECTOR FARIAS ET UX	Hidalgo	3.35	23	3
419	JULIAN OLGUIN ET UX	Hidalgo	1.65	23	3
420	JESSE RAY RUSSELL PARTNERSHIP	Hidalgo	504.375	23	3
420	LYDIA A FERNANDEZ	Hidalgo	129.15	23	3
420	ERNESTO M FERNANDEZ ET AL	Hidalgo	318.7	23	3
420	ERNESTO M FERNANDEZ	Hidalgo	24.221	23	3
420	SANTIAGO G FERNANDEZ	Hidalgo	28.25	23	3
420	GUADALUPE A FERNANDEZ	Hidalgo	28.25	23	3
420	AMADOR T FERNANDEZ	Hidalgo	28.25	23	3
420	GUADALUPE A FERNANDEZ ET AL	Hidalgo	47.5	23	3
420	JAMES MICHAEL FERNANDEZ	Hidalgo	15.85	23	3
420	B & P BRIDGE CO	Hidalgo	4.029	23	3
421	BILL L BURNS	Hidalgo	595.115	23	3
421	A A MARTIN ET UX	Hidalgo	30.75	23	3
421	RICHARD DAVIDSON	Hidalgo	31.275	23	3
421	E R NORMAN & H B WHITE	Hidalgo	40.405	23	3
421	GEORGE GARCIA ET UX	Hidalgo	2.5	23	3
421	JOSE RUIZ ET UX	Hidalgo	2.5	23	3
421	RENE RECIO VERA ET UX	Hidalgo	2.5	23	3
421	GAYLE CAMPBELL TRUSTEE	Hidalgo	6.25	23	3
421	NICOLAS R CANCINO ET UX	Hidalgo	2.55	23	3
422	GUADALUPE A FERNANDEZ TRUSTEE	Hidalgo	1250	23	3
423	V C CATTLE COMPANY INC	Hidalgo	2125	23	3
424	ERASMO S FLORES ET AL	Hidalgo	15	23	3
427	THE FORDYCE COMPANY	Hidalgo	62.5	23	3
429	TEXAS GLOBAL ENTERPRISES INC	Hidalgo	22.5	23	3
432	HIDALGO CO IRR DIST 5	Hidalgo	402.5	23	3
434	FULLER FARMS	Hidalgo	870.298	23	3
435	WILLIAM J THOMAS ET AL	Hidalgo	106.875	23	3
436	GENEVIEVE T DOUGHERTY TRUST #2	Hidalgo	126.25	23	3
436	WILLIAM J THOMAS ET AL	Hidalgo	61.25	23	3
438	RAFAEL GARCIA SR ET AL	Hidalgo	18.527	23	3
441	ABUNDIO GARZA JR	Hidalgo	21.5	23	3
441	BERTHA G LONGORIA	Hidalgo	10.75	23	3
441	DAVID ARCHIE LEAL	Hidalgo	15	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
441	LINDA ANNETTE C GARZA ET AL	Hidalgo	10.75	23	3
441	YOLANDA STILLMAN TRUSTEE	Hidalgo	10.75	23	3
441	EDUARDO J LONGORIA	Hidalgo	6.25	23	3
442	RICHARD B DRAWE ET AL	Hidalgo	112.5	23	3
443	AMELIA C GARZA	Hidalgo	42.5	23	3
447	SIGIFREDO GARZA ET UX	Hidalgo	85	23	3
448	TRAVIS NEWSOM	Hidalgo	2.039	23	3
448	PETER BOSCH	Hidalgo	2.039	23	3
449	JOSE C GARZA	Hidalgo	57.5	23	3
450	PEDRO RUIZ ET UX	Hidalgo	40	23	3
450	JOSE HINOJOSA JR ET UX	Hidalgo	5	23	3
450	MARCELA GARCIA	Hidalgo	10	23	3
451	OLGA ALANIZ	Hidalgo	5	23	3
452	HESTER ALMON GEORGE ESTATE	Hidalgo	58.75	23	3
454	HENRY KAWAHATA	Hidalgo	319.275	23	3
455	ANGEL SALINAS ET UX	Hidalgo	0.675	23	3
455	OCTAVIO ESTEBAN SALINAS	Hidalgo	0.35	23	3
455	ROBERT MONTALVO JR ET AL	Hidalgo	0.45	23	3
456	ANITA GUERRA	Hidalgo	44.375	23	3
457	MAURO L REYNA	Hidalgo	17.5	23	3
458	MARTIANO HANDY ET VIR	Hidalgo	6.587	23	3
458	ERNESTINA H BRIONES	Hidalgo	6.588	23	3
459	MRS E JOLENE GUSTAFSON	Hidalgo	1686.15	23	3
462	VERNON B HILL	Hidalgo	17	23	3
463	KENNETH WILKINS	Hidalgo	75.3075	23	3
463	TOM WILKINS	Hidalgo	30	23	3
464	DELTA LAKE IRRIGATION DISTRICT	Hidalgo	202.5	23	3
464	JOEL LOPEZ	Hidalgo	51.375	23	3
466	APOLONIO JACKSON	Hidalgo	82.5	23	3
468	SAM J BREWSTER	Hidalgo	27.5	23	3
469	JOHN T SULLIVAN	Hidalgo	18.75	23	3
470	ROGELIO JIMENEZ	Hidalgo	47.5	23	3
472	HENRY KAWAHATA	Hidalgo	656.75	23	3
473	JAMES L PAWLIK ET AL	Hidalgo	1088.725	23	3
477	N H KITAYAMA	Hidalgo	428.5	23	3
479	F E KNAPP & J A KNAPP	Hidalgo	638.225	23	3
480	KRENMUELLER FARMS	Hidalgo	3250	23	3
480	KRENMUELLER FARMS	Hidalgo	102.5	23	3
482	ALEJANDRO JAMES LEO ET AL	Hidalgo	45	23	3
484	A E LONGORIA ET AL	Hidalgo	517.5	23	3
489	G A MARTINEZ	Hidalgo	150	23	3
492	JOSE RAMIREZ JR ET AL	Hidalgo	290.625	23	3
493	C F SPIKES	Hidalgo	2.5	23	3
496	R E RATCLIFF	Hidalgo	85	23	3
502	JOSE F MARTINEZ JR	Hidalgo	162.5	23	3
506	MOORE & SONS FARMS INC	Hidalgo	743.8	23	3
507	JOSE MARIA MORA JR	Hidalgo	41.675	23	3
507	CONSUELO MORA DOMINGUEZ	Hidalgo	41.675	23	3
507	MARIA VICTORIA MORA BALLI	Hidalgo	41.65	23	3
509	ANDREA JACKSON VDA DE MUNOZ	Hidalgo	65.5	23	3
509	SAM J BREWSTER	Hidalgo	27	23	3
510	HERMILIO BAZAN ET UX	Hidalgo	30	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
512	E I FOSMIRE	Hidalgo	2.5	23	3
512	MCALLEN TRADE ZONE INC	Hidalgo	100	23	3
512	PARKER HANNIFIN CORPORATION	Hidalgo	100	23	3
512	MCALLEN INDUSTRIAL AUTH INC	Hidalgo	92.5	23	3
514	GRACE NEUHAUS RICHARDS TRUST	Hidalgo	16	23	3
518	BENZAMIN D OLIVAREZ ET AL	Hidalgo	217.075	23	3
521	R L DIAZ ET UX	Hidalgo	25	23	3
522	WILLARD O FIKE ET UX	Hidalgo	100.15	23	3
523	ROBERT EUGENE PAWLIK ET AL	Hidalgo	265	23	3
524	JOHN D PAWLIK ET AL	Hidalgo	1250	23	3
529	MRS BERTICE P BURRHUS	Hidalgo	32.5	23	3
530	TROPHY INTERNATIONAL INC	Hidalgo	173.012	23	3
530	ELDA BELINDA REYNA ET AL	Hidalgo	42.985	23	3
530	L S & V DISTRIBUTING CO	Hidalgo	5.205	23	3
534	JOE H RAMON TRUSTEE	Hidalgo	97.725	23	3
535	HUBERT E & HAROLD RHODES	Hidalgo	85	23	3
536	JOE H RAMON TRUSTEE	Hidalgo	92.5	23	3
537	RIO BANCO FARMS	Hidalgo	10	23	3
538	MHW OPERATIONS LTD ET AL	Hidalgo	2692.15	23	3
539	MISS CRISOLFA RIVAS	Hidalgo	82.5	23	3
541	FIKE FARMS	Hidalgo	97.725	23	3
543	HEATH STUART & SCHNEIDER INC	Hidalgo	50.242	23	3
543	PORFIRIO TIJERINA JR ET UX	Hidalgo	12.879	23	3
543	HARSHA PUTTAGUNTA ET UX	Hidalgo	18.9	23	3
543	TOMAS CEDILLO JR ET UX	Hidalgo	9.95	23	3
543	RODOLFO TREVINO ET UX	Hidalgo	10.9	23	3
543	LEONEL BAZAN	Hidalgo	12.725	23	3
543	ROBERT C ETTINGER	Hidalgo	12.725	23	3
543	DONALD P SOBOCINSKI ET AL	Hidalgo	12.725	23	3
543	EMERALD BAY CORPORATION	Hidalgo	12.955	23	3
543	RICK MARTIN	Hidalgo	49.895	23	3
543	RICHARD A GARZA	Hidalgo	12.825	23	3
543	HOMER WELLS	Hidalgo	12.625	23	3
543	REV JOHN J FISHER	Hidalgo	16	23	3
543	ST LOMITA GROVE COMPANY	Hidalgo	12.925	23	3
543	RICHARD A MARTIN ET UX	Hidalgo	25.6	23	3
544	MITSURU SAKAI	Hidalgo	200	23	3
545	ROSE MARIE SAKAI TRUSTEE	Hidalgo	605	23	3
553	FRANK SCHUSTER FARMS INC	Hidalgo	125	23	3
554	FRANK SCHUSTER FARMS INC	Hidalgo	1413.5	23	3
554	FRANK SCHUSTER FARMS INC	Hidalgo	102.5	23	3
554	FRANK SCHUSTER FARMS INC	Hidalgo	125	23	3
555	SANTA MARIA LTD	Hidalgo	480.5	23	3
558	CROW GRAVEL CO	Hidalgo	119.03	23	3
558	JON E LORING	Hidalgo	19.426	23	3
559	CROW GRAVEL COMPANY	Hidalgo	24.625	23	3
560	SHARYLAND WSC	Hidalgo	251.875	23	3
561	G SUEYASU	Hidalgo	191.075	23	3
562	JANE T SULLIVAN	Hidalgo	35	23	3
563	MCALLEN TRADE ZONE INC	Hidalgo	50	23	3
564	TEXAS PLANT FOOD COMPANY INC	Hidalgo	12.5	23	3
565	THE THEIMER TRUSTS	Hidalgo	1125	23	3

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566	IGNACIO TREVINO ESTATE	Hidalgo	81.5	23	3
568	ANN MOORE ET AL	Hidalgo	3.226	23	3
571	VALLEY ONIONS INC	Hidalgo	446.25	23	3
573	FRANCISCA RECIO DE VELA ET AL	Hidalgo	469.9	23	3
573	LAURO G GUERRA	Hidalgo	49.935	23	3
573	A L MARTINEZ	Hidalgo	9.807	23	3
573	CITY OF SAN JUAN	Hidalgo	73.418	23	3
576	COUNTY OF HIDALGO	Hidalgo	4.6	23	3
577	MARY JANE SOBEL	Hidalgo	237.76	23	3
577	JOHN CHARLES ANDERSON	Hidalgo	113.88	23	3
577	DAGOBERTO TREVINO	Hidalgo	453.36	23	3
578	MARY JANE SOBEL	Hidalgo	544.1	23	3
578	JOHN CHARLES ANDERSON ET AL	Hidalgo	310.9	23	3
579	SHARON REES WAITE ET AL	Hidalgo	1447.5	23	3
580	INO G WEISKE	Hidalgo	65	23	3
580	SOPHIE FOLEY	Hidalgo	10	23	3
581	INO G WEISKE	Hidalgo	25	23	3
582	KVS FAMILY LIMITED PARTNERSHIP	Hidalgo	312.5	23	3
584	TEXAS YOUTH COMMISSION	Hidalgo	225.96	23	3
584	NICOLAS MOLINA JR	Hidalgo	8.27	23	3
584	JOE H RAMON	Hidalgo	8.27	23	3
587	ELLA G WOOD	Hidalgo	95.98	23	3
587	LIEVEN J VAN RIET	Hidalgo	111.52	23	3
595	SANTOS VILLARREAL ET UX	Hidalgo	55	23	3
769	J G ROLANDO RUIZ	Hidalgo		23	3
802	HIDALGO COUNTY IRR DIST 16	Hidalgo	30748.85	23	3
803	LA FERIA ID CAMERON CO 3	Hidalgo	75625.925	23	3
803	CITY OF ROMA	Hidalgo	551.4	23	3
804	SANTA CRUZ IRR DIST 15	Hidalgo	77180	23	3
804	SANTA CRUZ IRR DIST 15	Hidalgo	4827.5	23	3
805	DONNA ID HIDALGO CO 1	Hidalgo	94063.6	23	3
806	HIDALGO CO WCID 19	Hidalgo	9437.57	23	3
807	VALLEY ACRES IRRIGATION DIST	Hidalgo	16124.25	23	3
808	HIDALGO CO IRR DIST 2	Hidalgo	137675	23	3
809	ENGLEMAN IRRIGATION DISTRICT	Hidalgo	18994.35	23	3
809	DELTA LAKE IRRIGATION DIST	Hidalgo	50	23	3
810	HIDALGO COUNTY IRR DIST 13	Hidalgo	4856.85	23	3
811	DELTA LAKE IRR DIST	Hidalgo	174776.375	23	3
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	177151.625	23	3
813	HIDALGO CO IRR DIST 5	Hidalgo	14234.625	23	3
815	TOWN OF PROGRESO	Hidalgo	173.7	23	3
816	HIDALGO CO IRR DIST 1	Hidalgo	85615	23	3
820	NORTH ALAMO WSC	Hidalgo	25	23	3
825	CITY OF EDCOUCH	Hidalgo	225.925	23	3
826	CITY OF ELSA	Hidalgo	697.6	23	3
827	CITY OF LA VILLA	Hidalgo	62.5	23	3
828	HIDALGO CO IRR DIST NO 6	Hidalgo	36513	23	3
832	HIDALGO CO WCID 18 PHARR	Hidalgo	5505.15	23	3
833	HIDALGO CO MUD 1	Hidalgo	1120.25	23	3
844	TEXAS DEPT OF TRANSPORTATION	Hidalgo	16.125	23	3
844	TEXAS DEPT OF TRANSPORTATION	Hidalgo	152.625	23	3
845	CITY OF MISSION	Hidalgo	429.325	23	3

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847	UNITED IRRIGATION DISTRICT	Hidalgo	57374.3142	23	3
848	HIDALGO CO WID 3	Hidalgo	9752.6	23	3
866	SOUTHMOST SCD & WIL-HID SCD	Hidalgo	200	23	3
867	TEXAS A & I UNIV CITRUS CENTER	Hidalgo	400	23	3
868	TEXAS AGRICULTURAL EXP STA 15	Hidalgo	390	23	3
875	CITY OF DONNA	Hidalgo	480	23	3
876	M L BRADY ESTATE	Hidalgo	86.25	23	3
877	ALFONSO MARIO CHAPA JR	Hidalgo	5	23	3
3192	HIDALGO CO IRR DIST 1	Hidalgo		23	3
3271	UNITED STATES DEPT OF INTERIOR	Hidalgo	2935	23	3
4520	VALLEY ACRES IRRIGATION DIST	Hidalgo	4700	22	3
4521	J R WADE FARMS INC	Hidalgo	1952.44	22	3
4522	BEN E. BEARDEN	Hidalgo	414	22	3
4524	ENGLEMAN IRRIGATION DIST	Hidalgo	254.5	22	3
5045	MARY LENA BECKWITH ET AL	Hidalgo	128	22	3
5300	S R S FARMS, A	Hidalgo	100	22	3
124	CITY OF EAGLE PASS	Maverick	22.5	23	3
2688	MAVERICK CO WCID 1	Maverick	725	23	3
2688	MAVERICK CO WCID 1	Maverick	270	23	3
2688	LA GRULLA, CITY OF	Maverick	15	23	3
2688	SNOWMASS INC	Maverick	1384.5	23	3
2688	SNOWMASS INC	Maverick	417.8955	23	3
2689	EDGAR B KINCAID ESTATE ET AL	Maverick	20	23	3
2691	ESTATE OF CHARLES S RITCHIE	Maverick	9.42	23	3
2691	E W RITCHIE JR	Maverick	132.42	23	3
2691	FANNIE RITCHIE MONDRAGON	Maverick	92.72	23	3
2691	MILDRED GOODSON	Maverick	92.72	23	3
2691	GRACIELA JUNE HEREDIA GONZALEZ	Maverick	92.72	23	3
2692	WILLIAM H GEORGE JR	Maverick	310	23	3
3998	CITY OF EAGLE PASS	Maverick	53	23	3
8	BrAZOS ELECTRIC POWER COOP INC	Starr	20	23	3
36	STARR PRODUCE COMPANY	Starr	93.2	23	3
138	L & L FARMS	Starr	4.6	23	3
138	CHARLES WHITTLE	Starr	5	23	3
138	SOUTH PADRE DEVELOPMENT INC	Starr	1394.25	23	3
138	UNITED STATES FISH & WILDLIFE SERVICE	Starr	377.9	23	3
190	STARR PRODUCE COMPANY	Starr	2488.11	23	3
190	CITY OF LA GRULLA	Starr	35	23	3
211	CLEMMACO LTD	Starr	21.798	23	3
239	OSBALDO A SAENZ	Starr	7.075	23	3
239	OSBALDO A SAENZ	Starr	20	23	3
246	SIXTO R SALINAS ET UX	Starr	11.487	23	3
570	ELMORE & STAHL INC ET AL	Starr	1631.462	23	3
598	TEXAS DEPT OF TRANSPORTATION	Starr	10.405	23	3
599	E & S FARMS	Starr	500	23	3
601	ANNETTE KATZ COTTINGHAM ET AL	Starr	1287	23	3
601	ANNETTE KATZ COTTINGHAM ET AL	Starr	1029.98	23	3
602	JESUS ALVAREZ ET UX	Starr	12.5	23	3
605	SERVANDO DE LA GARZA	Starr	50	23	3
606	ARTURO GARZA	Starr	21.05	23	3
607	GUADALUPE ALVAREZ ET AL	Starr	40	23	3
609	RIQUERIO ALVAREZ	Starr	7.5	23	3

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610	SABINO ALVAREZ ET AL	Starr	29.55	23	3
611	CIRIO C ROSA	Starr	5	23	3
614	MANUEL JAVIER BARRERA	Starr	45	23	3
615	RENE E BARRERA	Starr	20	23	3
616	ROSENDO GUERRA BARRERA	Starr	21.1	23	3
616	DIONICIA G GUTIERREZ ET AL	Starr	103.9	23	3
616	JOSE LUIS GARZA ET AL	Starr	187.5	23	3
616	RIO WATER SUPPLY CORPORATION	Starr	62.5	23	3
618	RUPERTO BALDEMAR ESCOBAR	Starr	112.5	23	3
619	JOEL ALVAREZ	Starr	10	23	3
621	PEDRO CASTILLO ESTATE	Starr	30	23	3
623	PEDRO A CHAPA ET UX	Starr	58.9	23	3
624	RAFAELA G CHAPA	Starr	23.7057	23	3
624	BLAS VILLARREAL JR	Starr	12.877	23	3
624	OSCAR JESUS VILLARREAL	Starr	12.877	23	3
624	BELINDA RODRIQUEZ ET AL	Starr	12.877	23	3
624	BLAS CHAPA	Starr	7.939	23	3
624	DORA CHAPA	Starr	2.1334	23	3
624	MARCELO CHAPA	Starr	2.1334	23	3
624	GILBERTO CHAPA ET AL	Starr	2.1334	23	3
624	MOISES CHAPA ET AL	Starr	2.1334	23	3
624	MARIA C MONTALVO	Starr	3.6907	23	3
624	JUANITA A MUNOZ	Starr	10	23	3
625	SHEERIN CHILDRENS TRUST	Starr	30.25	23	3
625	SHARYLAND WSC	Starr	282.05	23	3
625	HAROLD MUNAL	Starr	30.2	23	3
626	SINFORIANA G DOYNO ET AL	Starr	75	23	3
627	E & S FARMS	Starr	500	23	3
631	ARTURO GARZA ESCOBAR	Starr	25	23	3
632	ELOY ERASMO ESCOBAR	Starr	17.5	23	3
634	HERALDO ESCOBAR	Starr	62.5	23	3
635	FRONTON COOPERATIVE IRRIGATION	Starr	1445	23	3
636	WILLIAM J THOMAS ET AL	Starr	97.5	23	3
638	MARIA S PECK ET AL	Starr	750	23	3
639	EULOGIO & TOMAS GARCIA	Starr	20	23	3
641	FRANCISCO E GARCIA	Starr	137.5	23	3
644	JUAN DE DIOS GARCIA HEIRS	Starr	25	23	3
645	OLIVIA GARCIA DE RAMOS ET AL	Starr	275	23	3
648	PEDRO LONGORIA ET AL	Starr	288.79	23	3
651	MARCOS L GARZA ET AL	Starr	37.5	23	3
652	STARR-CAMARGO BRIDGE COMPANY	Starr	15.15	23	3
652	RAFAEL PENA ET UX	Starr	2.9	23	3
652	FRANCISCO GARZA ET UX	Starr	4.125	23	3
655	JUAN GARZA	Starr	9.875	23	3
656	JULIAN GARZA ET UX	Starr	150	23	3
657	FLAVIA GARZA MUNOZ	Starr	25	23	3
658	RENE G SMITH ET AL	Starr	26.175	23	3
659	TOMAS VALADEZ ET AL	Starr	70	23	3
660	BANNWORTHS INC	Starr	30	23	3
661	MARCOS L GARZA ET AL	Starr	87.5	23	3
662	FRANCISCO G VILLARREAL	Starr	25	23	3
663	SANTOS GARZA	Starr	25	23	3

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664	SILVESTRE G GARZA	Starr	9.875	23	3
665	ROGERIO GARZA ET AL	Starr	17.2	23	3
665	ROBERTO LUIS NARANJO	Starr	7.8	23	3
667	WILFRIDO GARZA	Starr	19.5	23	3
670	RAUL GONZALEZ	Starr	37.5	23	3
672	ELOY VERA	Starr	172.5	23	3
674	EULALIO GONZALEZ ET AL	Starr	27.775	23	3
678	SILVESTRE GARZA GONZALEZ	Starr	77	23	3
679	GRIFFIN & BRAND OF MCALLEN INC	Starr	882.342	23	3
679	ARTHUR E BECKWITH	Starr	82.45	23	3
679	BRAND CHRISTIAN YOUTH CAMP INC	Starr	217.458	23	3
679	TROPHY INTERNATIONAL INC	Starr	1487.4925	23	3
680	AUGUSTIN & ASCENCION B GUERRA	Starr	12.75	23	3
682	JOSE ROEL GONZALEZ	Starr	2.417	23	3
682	MARTIN GUERRA	Starr	0.083	23	3
683	FIDENCIO GUERRA	Starr	4.025	23	3
685	H P GUERRA JR ET AL	Starr	8.75	23	3
686	H P GUERRA JR	Starr	32.5	23	3
687	J C GUERRA	Starr	152.55	23	3
688	JOEL GUERRA ET AL	Starr	282.5	23	3
689	JOSE MARIA GUERRA ET AL	Starr	87.5	23	3
690	J H GUERRA ESTATE ET AL	Starr	655	23	3
693	SILVINA SOLIS HINOJOSA ET AL	Starr	80.02	23	3
693	GAYLE CAMPBELL TRUSTEE	Starr	1.19	23	3
696	NATALIA L HINOJOSA ESTATE	Starr	92.5	23	3
697	HUBERT R HUDSON ET AL	Starr	250	23	3
698	EDUARDO R IZAGUIRRE ET AL	Starr	32.5	23	3
704	LUIS GUERRA	Starr	33.35	23	3
704	RAFAEL PENA ET AL	Starr	33.35	23	3
706	SERAFIN GUERRERO ET AL	Starr	37.5	23	3
706	HORTENSIA G MARGO TRUSTEE	Starr	2.5	23	3
707	IGNACIA GUTIERREZ	Starr	35	23	3
708	ADOLFO PENA JR ET AL	Starr	37.5	23	3
709	ESTATE OF OLIVIA L GUTIERREZ	Starr	70	23	3
710	ESTATE OF OLIVIA L. GUTIERREZ	Starr	30	23	3
711	STARR PRODUCE COMPANY	Starr	822.175	23	3
711	STARR PRODUCE COMPANY	Starr	857.795	23	3
711	SHEERIN CHILDRENS TRUST	Starr	2085	23	3
711	RIO GRANDE CITY PUD	Starr	22.83	23	3
711	RIO WATER SUPPLY CORPORATION	Starr	12	23	3
711	CITY OF LA GRULLA	Starr	23	23	3
712	BOONE LA GRANGE	Starr	37.5	23	3
713	BOONE LA GRANGE ET AL	Starr	33.064	23	3
714	LIEVEN J VAN RIET MD	Starr	112.375	23	3
715	A E LONGORIA ET AL	Starr	347.5	23	3
716	PEDRO LOPEZ SR ESTATE	Starr	96.55	23	3
716	ENCARNACION SAENZ ET UX	Starr		23	3
716	JACINTO LEONIDES LOPEZ ET AL	Starr		23	3
716	PEDRO JUSTINO LOPEZ ET UX	Starr		23	3
716	ORRIS HOLLAND	Starr		23	3
716	ENCARNACION SAENZ JR	Starr		23	3
716	BANNWORTHS INC	Starr		23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
719	MARY LUND MCCALL ET AL	Starr	60	23	3
720	MARGO BROTHERS	Starr	887.5	23	3
722	STEPHANIE MARTINEZ	Starr	30	23	3
726	HORTENSIA G MARGO TRUSTEE	Starr	207.5	23	3
727	ROEL ANGEL MOLINA ET AL	Starr	95	23	3
727	RENE MOLINA	Starr	10	23	3
727	TOMAS MOLINA	Starr	2.5	23	3
727	MARTIN MOLINA	Starr	2.5	23	3
728	RENE MOLINA	Starr	28.75	23	3
729	RENE MOLINA ET AL	Starr	297.5	23	3
730	KENNETH GILLHESPY	Starr	9.25	23	3
730	RAFAELA T BARRERA	Starr	9.25	23	3
731	CESARIO MONTALVO ET AL	Starr	37.5	23	3
732	CITY OF ROMA	Starr	27.5	23	3
733	REYNALDO MORENO ET AL	Starr	44.35	23	3
736	DOMINGO MUNIZ ET AL	Starr	30	23	3
737	LIBRADA P MUNIZ	Starr	19.25	23	3
737	JUAN MUNIZ ESTATE	Starr		23	3
738	NOE MUNIZ	Starr	59.7	23	3
741	BANNWORTHS INC	Starr	111.575	23	3
741	GAYLE CAMPBELL TRUSTEE	Starr	15.8375	23	3
741	ORRIS HOLLAND	Starr	15.8375	23	3
742	PABLO A RAMIREZ INC	Starr	220	23	3
743	CIRIO CONRADO ROSA ET UX	Starr	17.5	23	3
744	ANGELICA P FIERROS ET AL	Starr	205	23	3
745	EUGENIO PEREZ ESTATE	Starr	25	23	3
747	CLEMMACO LTD	Starr	12.5	23	3
747	RICHARD L MARGO	Starr	12.5	23	3
748	JOSE ALVAREZ	Starr	22.5	23	3
749	SEVERO PEREZ ET UX	Starr	10	23	3
750	BOONE LA GRANGE	Starr	25.53	23	3
752	DOMINGO PORRAS ET AL	Starr	9.525	23	3
753	MANUEL PORRAS ET AL	Starr	250	23	3
754	MANUEL PORRAS	Starr	34.05	23	3
755	ROEL ROBERTO RAMIREZ	Starr	192.5	23	3
757	IDOLINA MUNOZ RAMON	Starr	7.5	23	3
758	LEONARD J KOBERNAT ET AL	Starr	87.5	23	3
759	JOSE REYES	Starr	10.775	23	3
760	ROSALIO REYES	Starr	25	23	3
762	TEXAS PARKS & WILDLIFE DEPT	Starr	50	23	3
763	CONRADO RODRIGUEZ ET AL	Starr	30	23	3
765	AMERICO ELOY GARCIA ET AL	Starr	70	23	3
766	BIG RIVER DAIRIES INC	Starr	4.58	23	3
766	BENANCIO RODRIGUEZ ET AL	Starr	0.76	23	3
766	MANUEL REYES	Starr	1.71	23	3
767	STARR PRODUCE COMPANY	Starr	5415.586	23	3
767	STARR PRODUCE COMPANY	Starr	1146.22	23	3
767	SALVADOR GARCIA JR	Starr	59	23	3
768	MARIA LUISA BARRERA	Starr	100	23	3
769	J G ROLANDO RUIZ	Starr	15	23	3
771	EVANGELINA P SALINAS ET VIR	Starr	45	23	3
772	MARTIN CRUZ LUERA	Starr	125	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
773	JOSE G SANDOVAL	Starr	2.5	23	3
774	EVERARDO GARCIA JR ET UX	Starr	50	23	3
775	NAPOLEON SEPULVEDA ET AL	Starr	34.65	23	3
776	PABLO SEPULVEDA	Starr	5.55	23	3
777	STARR PRODUCE CO	Starr	3264.125	23	3
777	RIO WATER SUPPLY CORPORATION	Starr	131.25	23	3
777	UNITED STATES DEPT OF INTERIOR	Starr	354.625	23	3
778	JOHN A SHUFORD ET UX	Starr	500	23	3
778	STARR PRODUCE COMPANY	Starr	30	23	3
779	BENANCIO RODRIGUEZ ET AL	Starr	0.8	23	3
779	BIG RIVER DAIRIES INC	Starr	4.79	23	3
779	MANUEL REYES	Starr	1.78	23	3
780	RENE G SMITH	Starr	118.75	23	3
784	NARCISO SOLIS HEIRS	Starr	62.5	23	3
786	RAFAEL VALADEZ SOTO ESTATE	Starr	15	23	3
787	STARR PRODUCE COMPANY	Starr	1250	23	3
788	JOEL F SALINAS ET UX	Starr	21.25	23	3
789	J E TREVINO ET AL	Starr	55	23	3
794	DESIDERIO VERA	Starr	7.5	23	3
797	JOSE G VILLARREAL ET UX	Starr	87.5	23	3
798	JESUS L VILLARREAL	Starr	100	23	3
799	AMERICO ELOY GARCIA	Starr	28	23	3
799	MARTA R SEPULVEDA ET AL	Starr	22	23	3
844	TEXAS DEPT OF TRANSPORTATION	Starr		23	3
4556	SANTANA CARRERA ESTATE	Starr	193	23	3
4557	BANNWORTHS INC	Starr	200	23	3
770	ARTURO VOLPE ET UX	Webb	125	23	3
2421	BRASK-DUMONT RANCH	Webb	3071	23	3
2421	BRASK-DUMONT RANCH	Webb	119	23	3
2421	J E BRAVO	Webb	1	23	3
2421	ADAM VOLPE	Webb	37	23	3
2421	ADAM VOLPE	Webb	13	23	3
2422	LAWRENCE A MANN TRUSTEE	Webb	118	23	3
2422	CYRIA O CONVERSE	Webb	3	23	3
2422	LEONEL GONZALES	Webb	10	23	3
2422	JAIME A GONZALEZ JR	Webb	2	23	3
2422	PATRICIA B SANDITEN	Webb	52	23	3
2422	RICHARD E HAYNES ET AL	Webb	5	23	3
2422	VIMOSA II	Webb	94	23	3
2424	ALBERT & FRANCES MUEHSAM	Webb	1	23	3
2425	GAYLEN GILBREATH	Webb	1	23	3
2427	PARIS A MIMS ET UX	Webb	1	23	3
2432	THEODORE C MILLER	Webb	1	23	3
2433	C E & EVELYN DEYO	Webb	1	23	3
2434	CHARLES WALTER & RUTH WALTER	Webb	1	23	3
2435	LAM INVESTMENTS CO	Webb	1	23	3
2435	T C MILLER	Webb	0.69	23	3
2435	T C MILLER	Webb	0.31	23	3
2435	JAVIER REYES ET UX	Webb	1	23	3
2435	JOSEPH E MILLS	Webb	0.75	23	3
2435	JOSEPH E MILLS	Webb	0.25	23	3
2435	M L CAVE ET UX	Webb	1	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
2435	FREDERICK J KILIAN ET UX	Webb	1	23	3
2435	ROCK H WILKINSON ET UX	Webb	1	23	3
2435	ANTONIO CARLOS LOPEZ	Webb	4	23	3
2435	ROMEO R RAMIREZ	Webb	1	23	3
2435	RAUL R ESPARZA	Webb	1	23	3
2435	DAN AUGUST RICHTER	Webb	1	23	3
2435	MONTE E MCDANIEL	Webb	1	23	3
2435	LEYENDECKER MATERIALS INC	Webb	10	23	3
2695	TED S. SCIBIENSKI	Webb	2554	23	3
2696	5D INC	Webb	990	23	3
2697	FRED M BRUNI	Webb	225	23	3
2698	MANDEL PROPERTIES LTD	Webb	580	23	3
2699	MAURICE M ALEXANDER ET AL	Webb	450	23	3
2700	WILLIAM CLARENCE BARFIELD ET AL	Webb	20.373	23	3
2700	GARY WAYNE WILKINSON ET UX	Webb	14.426	23	3
2700	CITY READY MIX INC	Webb	35.574	23	3
2703	GARY WAYNE WILKINSON ET UX	Webb	33.3	23	3
2704	ARMADILLO CONSTRUCTION CO INC	Webb	42	23	3
2704	JAMES HAYNES JR	Webb	20	23	3
2704	INTERNATIONAL BANK OF COMMERCE	Webb	20	23	3
2704	PATRICIA B SANDITEN	Webb	8.5	23	3
2704	ARTURO VOLPE	Webb	15	23	3
2705	HAIZLIP RANCH LP	Webb	120	23	3
2706	BEN-HUR ENTERPRISES LTD	Webb	382	23	3
2710	NIXON RANCH PARTNERSHIP	Webb	80	23	3
2711	FLORENCE G ARCE	Webb	80.667	23	3
2711	JAVIER E GARZA ET AL	Webb	36.035	23	3
2712	JULIA B MULLER RUHLMAN	Webb	264	23	3
2712	JULIA B MULLER RUHLMAN	Webb	145	23	3
2713	ROBERT MULLER LTD	Webb	336	23	3
2713	ROBERT MULLER LTD	Webb	304	23	3
2713	ALBERT F MULLER JR	Webb	264	23	3
2714	BARBARA T FASKEN	Webb	2220	23	3
2714	BARBARA T FASKEN	Webb		23	3
2715	MINES ROAD DEVELOPMENT L C	Webb	175	23	3
2721	KILLAM DEVELOPMENT CORP	Webb	337	23	3
2724	RODOLFO V SOLIS	Webb	25	23	3
2727	AEP TEXAS CENTRAL COMPANY	Webb		23	3
2733	ANZON INC	Webb	24	23	3
2735	UNITED STATES DEPT OF LABOR	Webb	11.512	23	3
2742	LAREDO MUNIC JR COLLEGE DIST	Webb	31	23	3
2743	RANDOLPH SLAUGHTER ET AL	Webb	56	23	3
2744	COUNTY OF WEBB	Webb	600	23	3
2746	SACRED HEART CHILDRENS HOME	Webb	28.5	23	3
2748	FRANCIS RICHTER FARM PARTNERS	Webb	100	23	3
2750	M C PROPERTIES PARTNERSHIP	Webb	75	23	3
2751	J C TREVINO JR	Webb	254	23	3
2753	PABLO HERNANDEZ	Webb	19	23	3
2754	MARTHA CADENA	Webb	12	23	3
2755	CASSO LTD	Webb	250	23	3
2756	MICHAEL ALLEN MACMAHON ET AL	Webb	255	23	3
2757	HORACIO ACEVEDO ET AL	Webb	260	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
2758	VERA W HAERING	Webb	248	23	3
2759	CARLOS Y BENAVIDES JR ET AL	Webb	500	23	3
2759	WINFIELD LTD	Webb	112	23	3
2759	KILLAM DEVELOPMENT CORPORATION	Webb	500	23	3
2760	CLOTILDE E VALLS ET AL	Webb	50	23	3
2761	WILLIAM H MCKENDRICK III	Webb	166.65	23	3
2761	WILLIAM H MCKENDRICK III	Webb	49.995	23	3
2761	ALBERT F MULLER JR	Webb	47.5	23	3
2761	ALBERT F MULLER JR	Webb	14.25	23	3
2761	ROSA E MCKENDRICK TRUSTEE	Webb	47.5	23	3
2761	ROSA E MCKENDRICK TRUSTEE	Webb	14.25	23	3
2762	SALINAS INVESTMENTS	Webb	88	23	3
2763	LAREDO NATIONAL BANK TRUSTEE	Webb	1500	23	3
2764	H B O'KEEFE ESTATE	Webb	700	23	3
2766	RICARDO DE ANDA TRUSTEE	Webb	20	23	3
2767	GAYLE CAMPBELL TRUSTEE	Webb	180	23	3
2768	LASKER O'KEEFE HEREFORD	Webb	1350	23	3
2769	CLARK FARMS LTD	Webb	1101	23	3
2771	AGUSTIN VELA	Webb	9	23	3
2772	RANCHO BLANCO CORPORATION	Webb	900	23	3
2772	RANCHO BLANCO CORPORATION	Webb	2812	23	3
2773	MARY H MILLER	Webb	311	23	3
2774	ANA ALICIA PENA BECERRA ET AL	Webb	207	23	3
2774	JESUS ENRIQUE BRIONES	Webb	207	23	3
2774	GERALDINE MCCANN SISCO	Webb	207	23	3
2774	ENRIQUETA L ZIMMERMAN	Webb	207	23	3
2782	ANTONIO R SANCHEZ, ESTATE OF	Webb	80	23	3
2812	SHERRY R LEWIS ET AL	Webb	50	23	3
3910	VAQUILLAS RANCH CO LTD	Webb	200	21	3
2	MRS E JOLENE GUSTAFSON	Willacy	164.8	23	3
3	DELTA LAKE IRRIGATION DISTRICT	Willacy	250	23	3
4	GLEN REGENSCHEID ET UX	Willacy	2.5	23	3
7	BILLIE P BROWN	Willacy	242.5	23	3
8	ROY DAVID PENA ET UX	Willacy	5	23	3
138	SUNNYDEW WATER SUPPLY CORP	Willacy	5	23	3
226	SUNNY DEW WSC	Willacy	5	23	3
822	CITY OF RAYMONDVILLE	Willacy	223.95	23	3
4531	LLOYD FUNK ET AL	Willacy	3640	22	3
4532	D L SMITH JR ET AL	Willacy	187.5	22	3
4533	LLOYD BENTSEN ET AL	Willacy	6889	22	3
844	TEXAS DEPT OF TRANSPORTATION	Zapata		23	3
2429	STRAUD B JACOBS ET UX	Zapata	1	23	3
2431	TROY D WELDON ET UX	Zapata	2	23	3
2652	GREGORIO DAMIAN GOMEZ ET UX	Zapata	6	23	3
2658	SALVADOR GARCIA	Zapata	58	23	3
2718	C O RIVES	Zapata	0.226	23	3
2718	BARTON E ANDERSON ET UX	Zapata	0.774	23	3
2725	CYRUS B. REYNOLDS ET UX	Zapata	5	23	3
2736	JOEL RUIZ ET UX	Zapata	4	23	3
2775	ROBERTO J VIDAURRI	Zapata	260.2	23	3
2775	MARIA LUISA VIDAURRI STOTT	Zapata	250.2	23	3
2775	GERARDO VIDAURRI ET AL	Zapata	260.2	23	3

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
2775	ROSEMARIE ANN GEARY	Zapata	104.08	23	3
2775	FRANCIS MATTHEW HERBST JR	Zapata	99.08	23	3
2775	MARY JOSEPHINE H GARCIA	Zapata	104.08	23	3
2775	EDWARD JAMES HERBST	Zapata	104.08	23	3
2775	ALFREDO JOSEPH HERBST	Zapata	104.08	23	3
2776	TEXAS A&M UNIVERSITY SYSTEM	Zapata	1353	23	3
2777	FENDER EXPLORATION & PRODUCTION CO LI	Zapata	1279	23	3
2778	KNAPP-SHERRILL CO	Zapata	75	23	3
2778	KNAPP-SHERRILL CO	Zapata	2036	23	3
2779	LARRY G HANCOCK	Zapata	122	23	3
2780	LANNIE MECOM	Zapata	1025	23	3
2781	FERNANDO GUTIERREZ ET AL	Zapata	51	23	3
2781	CESAR A MORALES ET UX	Zapata	5	23	3
2782	ANTONIO R SANCHEZ, ESTATE OF	Zapata	130	23	3
2782	M C PROPERTIES PARTNERSHIP	Zapata	254.22	23	3
2782	M C PROPERTIES PARTNERSHIP	Zapata	358.78	23	3
2783	HUGO A GUTIERREZ JR TRUSTEE	Zapata	28.68	23	3
2784	DELFINO LOZANO JR ET AL	Zapata	171	23	3
2786	EL CAMPO FARM COMPANY	Zapata	829	23	3
2787	OSCAR O LOPEZ	Zapata	30	23	3
2788	GUADALUPE MARTINEZ ET AL	Zapata	168	23	3
2791	MARIA EVA URIBE RAMIREZ	Zapata	86	23	3
2793	JORGE & IRMA URIBE	Zapata	76	23	3
2794	HAGCO BUILDING SYSTEMS INC ET AL	Zapata	221	23	3
2797	ANTONIO RAMIREZ ET AL	Zapata	7.03	23	3
2797	GUADALUPE TREVINO ET AL	Zapata	18.05	23	3
2797	JUAN FRANCISCO RAMIREZ ET AL	Zapata	8.63	23	3
2799	AMANDA G RASH ET AL	Zapata	305.76	23	3
2800	JOSE F GUTIERREZ SR ET AL	Zapata	56	23	3
2800	HOMERO ELIZONDO ET UX	Zapata	3	23	3
2804	ELENA F STOKES	Zapata	4.75	23	3
3313	RAMIRO V MARTINEZ	Zapata	140	23	3
285	MICHAEL A MACMAHON	Cameron	9.62	23	4
742	PABLO A RAMIREZ INC	Cameron		23	4
2700	DOUGLAS M BRICE	Cameron		23	4
2708	JOEL RUIZ ET UX	Cameron		23	4
339	RUFINO GARZA ET AL	Hidalgo	125	23	4
421	LUCIO E GONZALEZ JR	Hidalgo	5	23	4
742	PABLO A RAMIREZ INC	Hidalgo		23	4
802	HIDALGO COUNTY IRR DIST 16	Hidalgo	200	23	4
808	HIDALGO CO IRR DIST 2	Hidalgo	100	23	4
848	HIDALGO CO WID 3	Hidalgo	100	23	4
2700	DOUGLAS M BRICE	Hidalgo		23	4
2708	JOEL RUIZ ET UX	Hidalgo		23	4
2688	KATHRYN RITCHIE COTTER ET AL	Maverick	10	23	4
2690	ALAMO CONCRETE PRODUCTS LTD	Maverick	78	23	4
2691	MILDRED GOODSON	Maverick		23	4
2700	DOUGLAS M BRICE	Maverick		23	4
2706	DE LOS SANTOS READY MIX	Maverick	2	23	4
633	ROSITA GRAVEL INC	Starr	22.5	23	4
742	PABLO A RAMIREZ INC	Starr	30	23	4
2700	DOUGLAS M BRICE	Starr		23	4

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
2708	JOEL RUIZ ET UX	Starr		23	4
2422	CHRISTINE MCKEE	Webb	1	23	4
2422	HACHAR REAL ESTATE COMPANY	Webb	23	23	4
2698	MANDEL PROPERTIES LTD	Webb	100	23	4
2699	MAURICE M ALEXANDER ET AL	Webb	30	23	4
2699	LAREDO SAND & GRAVEL CO	Webb	20	23	4
2700	CITY READY MIX INC	Webb	100	23	4
2700	DOUGLAS M BRICE	Webb	131.557	23	4
2704	J & B CONTRACTORS INC	Webb	2	23	4
2706	BEN-HUR ENTERPRISES LTD	Webb		23	4
2708	JOEL RUIZ ET UX	Webb		23	4
2714	BARBARA T FASKEN	Webb	200	23	4
2727	AEP TEXAS CENTRAL COMPANY	Webb		23	4
2734	RODOLFO GARCIA	Webb	75	23	4
2742	RODOLFO GARCIA	Webb	62	23	4
2747	UNION PACIFIC OIL & GAS CO	Webb	5	23	4
2747	ALICE SOUTHERN EQUIP SERVICE	Webb	145	23	4
2747	ALICE SOUTHERN EQUIP SERVICE	Webb	175	23	4
2756	MICHAEL ALLEN MACMAHON ET AL	Webb	120	23	4
2761	WILLIAM H MCKENDRICK III	Webb	8.3325	23	4
2761	ALBERT F MULLER JR	Webb	2.375	23	4
2761	ROSA E MCKENDRICK TRUSTEE	Webb	2.375	23	4
2764	H B O'KEEFE ESTATE	Webb	100	23	4
2769	CLARK FARMS LTD	Webb	45	23	4
2772	RANCHO BLANCO CORPORATION	Webb	300	23	4
2812	LOUIS C LECHENGER ET AL	Webb	20	23	4
742	PABLO A RAMIREZ INC	Willacy		23	4
2708	JOEL RUIZ ET UX	Willacy		23	4
68	KCS RESOURCES INC	Zapata	25	23	4
215	JAMES C GUERRA ET AL	Zapata	12.5	23	4
487	ANTONIO R SANCHEZ SR ESTATE	Zapata	50	23	4
487	ANTONIO R SANCHEZ SR ESTATE	Zapata	50.425	23	4
742	PABLO A RAMIREZ INC	Zapata		23	4
2700	DOUGLAS M BRICE	Zapata		23	4
2708	JOEL RUIZ ET UX	Zapata	20	23	4
2775	ROBERTO J VIDAURRI	Zapata		23	4
2775	MARIA LUISA VIDAURRI STOTT	Zapata	10	23	4
2775	ROSEMARIE ANN GEARY	Zapata		23	4
2775	FRANCIS MATTHEW HERBST JR	Zapata	5	23	4
2777	FENDER EXPLORATION & PRODUCTION CO LI	Zapata	20	23	4
2779	LARRY G HANCOCK	Zapata	80	23	4
2780	LANNIE MECOM	Zapata	25	23	4
2786	EL CAMPO FARM COMPANY	Zapata	25	23	4
2791	MARIA EVA URIBE RAMIREZ	Zapata	10	23	4
2799	UNICO CONSTRUCTION CO	Zapata	11.24	23	4
5066	SOUTH TEXAS ELECTRIC CO-OP INC	Starr	1200000	23	5
5066	MEDINA ELECTRIC CO-OP INC	Starr		23	5
126	U S FISH & WILDLIFE SERVICE	Cameron		23	7
4323	CASTRO DEVELOPMENT CO INC	Cameron		22	7
4323	J M HEANER DEVELOPMENT INC	Cameron		22	7
4536	TOWN OF RIO HONDO	Cameron		22	7
4539	UNITED STATES DEPT OF INTERIOR	Cameron		22	7

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
4543	THOMAS H SWEENEY JR ET AL	Cameron		22	7
2076	UNITED STATES DEPT OF INTERIOR	Hidalgo	1000	23	7
2691	MILDRED GOODSON	Maverick		23	7
3525	WINN EXPLORATION CO INC	Maverick		23	7
2772	RANCHO BLANCO CORPORATION	Webb		23	7
3732	RADCLIFFE KILLAM ET AL	Webb		23	7
4538	CAMERON CO IRR DIST NO 2	Cameron		22	8
4539	UNITED STATES DEPT OF INTERIOR	Cameron	7000	22	8
4539	UNITED STATES DEPT OF INTERIOR	Cameron		22	8
4543	THOMAS H SWEENEY JR ET AL	Cameron		22	8
4551	LAGUNA MADRE WATER DISTRICT	Cameron		22	8
4555	BROWNSVILLE PUBLIC UTIL BOARD	Cameron		22	8
5019	UT - PAN AM UNIVERSITY	Cameron	13.44	22	8
4523	HIDALGO CO IRR DIST 1	Hidalgo		22	8
2694	BRISCOE RANCH INC	Webb	50	23	8
831	HARLINGEN IRR DIST	Cameron	4692	23	11
850	LAGUNA MADRE WATER DISTRICT	Cameron	100	23	11
4543	THOMAS H SWEENEY JR ET AL	Cameron	3300	22	11
4544	UNITED STATES DEPT OF INTERIOR	Cameron		22	11
802	HIDALGO COUNTY IRR DIST 16	Hidalgo	100	23	11
803	LA FERIA ID CAMERON CO 3	Hidalgo	2152	23	11
804	SANTA CRUZ IRR DIST 15	Hidalgo	120	23	11
805	DONNA ID HIDALGO CO 1	Hidalgo	2690	23	11
809	ENGLEMAN IRRIGATION DISTRICT	Hidalgo	80	23	11
811	DELTA LAKE IRR DIST	Hidalgo	1320	23	11
812	HIDALGO & CAMERON CO WCID NO 9	Hidalgo	4163	23	11
816	HIDALGO CO IRR DIST 1	Hidalgo	1220	23	11
846	UNITED IRRIGATION DISTRICT	Hidalgo		23	11
116	DOS REPUBLICAS COAL PARTNERSHP	Maverick	125	23	11
3525	WINN EXPLORATION CO INC	Maverick		23	11
5201	COMANCHE MAVERICK RANCH INVESTMENTS	Maverick		21	11
5640	RIO BRAVO LAND CO	Maverick		23	11
5640	RIO BRAVO LAND CO	Maverick		23	11
5640	RIO BRAVO LAND CO	Maverick		23	11
5654	BRISCOE RANCH INC	Maverick		23	11
5657	ROBERT B GOLDSBURY	Maverick		23	11
5668	WALTER UMPHREY	Maverick		23	11
3732	RADCLIFFE KILLAM ET AL	Webb		23	11
3929	VAQUILLAS RANCH CO LTD	Webb		23	11
5653	BRISCOE RANCH INC	Webb		21	11
5653	BRISCOE RANCH INC	Webb		21	11
5653	BRISCOE RANCH INC	Webb		21	11
5653	BRISCOE RANCH INC	Webb		21	11
5653	BRISCOE RANCH INC	Webb		21	11
5653	BRISCOE RANCH INC	Webb		21	11
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11

Water right description

WR Number	Owner Name	County	Amount in Ac-Ft/Yr	Basin	Use
5654	BRISCOE RANCH INC	Webb		23	11
5654	BRISCOE RANCH INC	Webb		23	11
5660	ROBERT B NUNLEY JR ET AL	Webb		21	11
5660	ROBERT B NUNLEY JR ET AL	Webb		21	11
5660	ROBERT B NUNLEY JR ET AL	Webb		21	11
5649	HINNANT & FULBRIGHT LTD	Zapata		23	11
5649	HINNANT & FULBRIGHT LTD	Zapata		23	11
4412	BOCA CHICA WATER SUPPLY INC	Cameron		23	13
5259	BROWNSVILLE PUBLIC UTIL BOARD	Cameron		23	13
	Domestic	20062			
	Municipal	305997.1178			
	Industrial	64625.628			
		390684.7458			

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Region M Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	1,209,647	1,163,633	1,082,231	981,749	981,749	981,749	981,749

Current Water Supply Type	Source	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)		**735,291**	**752,996**	**746,007**	**739,519**	**733,031**	**726,541**	**720,552**
Projected Supply Surplus/Deficit		**-474,356**	**-410,638**	**-336,224**	**-242,230**	**-248,718**	**-255,208**	**-261,197**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	219,226	$ 55,547,585.23	$ 253.38		36,529	73,085	109,613	146,142	182,698	219,226
Conveyance System Conservation	218,783	$ 26,402,708.30	$ 120.68		91,160	182,319	191,435	200,551	209,667	218,783
Total WMS Yield					127,688	255,404	301,048	346,693	392,365	438,009

WATER SUPPLY AND DEMAND ANALYSIS								
Irrigation: Zapata County								
Year		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Water Demand		7,763	6,454	6,121	5,805	5,805	5,805	5,805
Current Water Supply Type	**Source**							
Surface Water	Amistad/Falcon	3,991	3,960	3,920	3,884	3,847	3,810	3,776
Surface Water	Tributaries	83	116	116	116	116	116	116
Ground Water		1,000	0	0	0	0	0	0
Total Supply (AF/yr)		**5,074**	**4,076**	**4,036**	**4,000**	**3,963**	**3,926**	**3,892**
Projected Supply Surplus/Deficit		**-2,689**	**-2,378**	**-2,085**	**-1,805**	**-1,842**	**-1,879**	**-1,913**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	0	$ -	$ 253.38		0	0	0	0	0	0
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS								
Irrigation: Willacy County								
Year		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Water Demand		58,586	59,191	60,203	60,623	60,623	60,623	60,623

Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	34,525	34,257	33,915	33,598	33,281	32,964	32,672
Surface Water	IRRIGATION LOCAL SUPPLY	899	899	899	899	899	899	899
Ground Water	GULF COAST	30	0	0	0	0	0	0
Total Supply (AF/yr)	**0**	**35,454**	**35,156**	**34,814**	**34,497**	**34,180**	**33,863**	**33,571**
Projected Supply Surplus/Deficit		**-23,132**	**-24,035**	**-25,389**	**-26,126**	**-26,443**	**-26,760**	**-27,052**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	7,808	$ 1,978,391.04	$ 253.38		1,301	2602.99	3904	5205.01	6506.99	7808
Conveyance System Conservation	9,345	$ 1,127,718.40	$ 120.68		3,894	7,787	8,177	8,566	8,955	9,345

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Webb County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			23,723	20,507	19,548	18,654	18,654	18,654	18,654
Current Water Supply	**Source**								
Surface Water	AMISTAD/FALCON		10603	10520	10415	10318	10221	10123	10034
Surface Water	TRIBS TO RIO GRANDE		29.65	20	20	20	20	20	20
Surface Water	TRIBS TO RIO GRANDE		148.25	98	98	98	98	98	98
Surface Water	TRIBS TO RIO GRANDE		29.65	33	33	33	33	33	33
Surface Water	TRIBS TO RIO GRANDE		118.6	0	0	0	0	0	0
Surface Water	TRIBS TO RIO GRANDE		0	0	0	0	0	0	0
Surface Water	TRIBS TO RIO GRANDE		0	0	0	0	0	0	0
Surface Water	REUSE		795	1120	1120	1120	1120	1120	1120
Ground Water	CARRIZO-WILCOX		1963	135.372	135.372	135.372	135.372	135.372	135.372
Ground Water	CARRIZO-WILCOX		1014	1043.16	1043.16	1043.16	1043.16	1043.16	1043.16
Ground Water	GULF COAST		6	47.1751	47.1751	47.1751	47.1751	47.1751	47.1751
Ground Water	GULF COAST		28	67.3946	67.3946	67.3946	67.3946	67.3946	67.3946
Ground Water	GULF COAST		56	363.525	363.525	363.525	363.525	363.525	363.525
Ground Water	OTHER AQUIFER		446	22.562	22.562	22.562	22.562	22.562	22.562
Ground Water	OTHER AQUIFER		62	32.2322	32.2322	32.2322	32.2322	32.2322	32.2322
Ground Water	OTHER AQUIFER		492	173.86	173.86	173.86	173.86	173.86	173.86
Total Supply (AF/yr)		**0**	**15791.2**	**13676.3**	**13571.3**	**13474.3**	**13377.3**	**13279.3**	**13190.3**
Projected Supply Surplus/Deficit			**-7,932**	**-6,830**	**-5,977**	**-5,179**	**-5,276**	**-5,374**	**-5,463**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	0	$ -	$ 253.38		0	0	0	0	0	0
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Starr County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			30,693	31,191	30,108	29,070	29,070	29,070	29,070
Current Water Supply	**Type**								
Surface Water	AMISTAD/FALCON		15,896	15,773	15,616	15,470	15,324	15,178	15,043
Ground Water	GULF COAST		470	180	180	180	180	180	180
Ground Water	GULF COAST		1,523	576	576	576	576	576	576
Ground Water	OTHER AQUIFER		229	18	18	18	18	18	18
Ground Water	OTHER AQUIFER		1,927	5,821	5,821	5,821	5,821	5,821	5,821
Total Supply (AF/yr)		**0**	**20,045**	**22,368**	**22,211**	**22,065**	**21,919**	**21,773**	**21,638**
Projected Supply Surplus/Deficit			**-10,648**	**-8,823**	**-7,897**	**-7,005**	**-7,151**	**-7,297**	**-7,432**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	6,315	$ 1,600,145.38	$ 253.38		1,052	2105.33	3157.6	4209.87	5262.93	6315.2
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Maverick County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			93,145	95,040	91,693	87,863	87,863	87,863	87,863
Current Water Supply	**Source**								
Surface Water	AMISTAD/FALCON		54,176	53,755	53,219	52,722	52,224	51,727	51,268
Surface Water	REUSE		123	0	0	0	0	0	0
Surface Water	TRIBS TO RIO GRANDE		184	223	223	223	223	223	223
Surface Water	TRIBS TO RIO GRANDE		12	20	20	20	20	20	20
Ground Water	CARRIZO-WILCOX		37	729	729	729	729	729	729
Ground Water	CARRIZO-WILCOX		1,370	635	635	635	635	635	635
Ground Water	OTHER AQUIFER		879	4,224	4,224	4,224	4,224	4,224	4,224
Ground Water	OTHER AQUIFER		72	28	28	28	28	28	28
Total Supply (AF/yr)		**0**	**56,853**	**59,613**	**59,077**	**58,580**	**58,082**	**57,585**	**57,126**
Projected Supply Surplus/Deficit			**-36,292**	**-35,426**	**-32,616**	**-29,283**	**-29,781**	**-30,278**	**-30,737**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	12,918	$ 3,273,061.49	$ 253.38		2,152	4306.4	6458.8	8611.2	10765.2	12917.6
Conveyance System Conservation	24,944	$ 3,010,290.19	$ 120.68		10,394	20,787	21,826	22,866	23,905	24,944

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Jim Hogg County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		6,413	817	817	817	817	817	817

Current Water Supply	Source							
Ground Water	GULF COAST	4,799	735	735	735	735	735	735
Ground Water	GULF COAST	1,614	82	82	82	82	82	82
Total Supply (AF/yr)		**6,413**	**817**	**817**	**817**	**817**	**817**	**817**
Projected Supply Surplus/Deficit		**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	0	$ -	$ 253.38		0	0	0	0	0	0
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Hidalgo County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			611,399	583,030	525,971	453,772	453,772	453,772	453,772

Current Water Supply	Source								
Surface Water	AMISTAD/FALCON		360,331	357,532	353,969	350,661	347,353	344,045	340,991
Surface Water	AMISTAD/FALCON		2,928	2,905	2,877	2,850	2,823	2,796	2,771
Surface Water	REUSE		166	4,288	4,288	4,288	4,288	4,288	4,288
Surface Water	IRRIGATION LOCAL SUPPLY		79	79	79	79	79	79	79
Ground Water	GULF COAST		4,330	19,383	19,383	19,383	19,383	19,383	19,383
Ground Water	GULF COAST		185	1,020	1,020	1,020	1,020	1,020	1,020
Total Supply (AF/yr)		**0**	**368,019**	**385,207**	**381,616**	**378,281**	**374,946**	**371,611**	**368,532**
Projected Supply Surplus/Deficit			**-243,380**	**-197,823**	**-144,355**	**-75,491**	**-78,826**	**-82,161**	**-85,240**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	130,228	$ 32,997,170.64	$ 253.38		21,699	43414.76	65114	86813.24	108528.8	130228
Conveyance System Conservation	118,958	$ 14,355,899.71	$ 120.68		49,566	99,132	104,089	109,045	114,002	118,958

WATER SUPPLY AND DEMAND ANALYSIS								
Irrigation: Cameron County								
Year		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Water Demand		377,925	367,404	347,771	325,144	325,144	325,144	325,144
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	214,002	212,340	210,224	208,259	206,295	204,330	202,516
Surface Water	AMISTAD/FALCON	10,300	10,220	10,118	10,023	9,929	9,834	9,747
Surface Water	REUSE	236	239	239	239	239	239	239
Surface Water	IRRIGATION LOCAL SUPPLY	2,610	2,610	2,610	2,610	2,610	2,610	2,610
Ground Water	GULF COAST	494	6,673	6,673	6,673	6,673	6,673	6,673
Total Supply (AF/yr)		**227,642**	**232,082**	**229,864**	**227,804**	**225,746**	**223,686**	**221,785**
Projected Supply Surplus/Deficit		**-150,283**	**-135,322**	**-117,907**	**-97,340**	**-99,398**	**-101,458**	**-103,359**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
On-Farm Water Conservation	61,958	$ 15,698,816.69	$ 253.38		10,324	20655.1	30978.8	41302.5	51633.9	61957.6
Conveyance System Conservation	65,535	$ 7,908,800.00	$ 120.68		27,306	54,613	57,343	60,074	62,805	65,535

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	3869	4186	4341	4433	4523	4612	4692

Current Water Supply	Source							
Total Supply (AF/yr)		**17,842**	**4,941**	**5,087**	**5,168**	**5,249**	**5,329**	**5,397**
Projected Supply Surplus/Deficit		**13,973**	**755**	**746**	**735**	**726**	**717**	**705**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Zapata County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		27	24	23	23	23	23	23

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	135	134	132	131	130	129	127
Groundwater	OTHER AQUIFER	1,000	0	0	0	0	0	0
Total Supply (AF/yr)		**1,135**	**134**	**132**	**131**	**130**	**129**	**127**
Projected Supply Surplus/Deficit		**1,108**	**110**	**109**	**108**	**107**	**106**	**104**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Willacy County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		6	6	6	6	6	6	6

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	0	0	0	0	0	0	0
Ground Water	GULF COAST	30	6	6	6	6	6	6
Total Supply (AF/yr)		**30**	**6**	**6**	**6**	**6**	**6**	**6**
Projected Supply Surplus/Deficit		**24**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1262	1204	1192	1189	1187	1185	1180
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	228	226	224	222	220	218	216
Surface Water	AMISTAD/FALCON	313	311	308	305	302	299	297
Surface Water	AMISTAD/FALCON	111	110	109	108	107	106	104
Ground Water	CARRIZO-WILCOX	6,046	360	357	356	356	355	354
Ground Water	CARRIZO-WILCOX	3,122	158	156	156	155	155	154
Ground Water	GULF COAST	120	126	124	124	124	124	123
Ground Water	GULF COAST	518	96	95	95	95	95	94
Ground Water	GULF COAST	103	55	54	54	54	54	54
Ground Water	OTHER AQUIFER	9	60	60	59	59	59	59
Ground Water	OTHER AQUIFER	1	46	46	46	45	45	45
Ground Water	OTHER AQUIFER	10	26	26	26	26	26	26
Total Supply (AF/yr)		**10,581**	**1,574**	**1,559**	**1,551**	**1,543**	**1,536**	**1,526**
Projected Supply Surplus/Deficit		**9,319**	**370**	**367**	**362**	**356**	**351**	**346**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Starr County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1203	1315	1355	1373	1390	1407	1426

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	12	11	11	11	11	11	11
Surface Water	AMISTAD/FALCON	9	9	9.11787	8.70996	8.71814	8.71727	8.30135
Ground Water	GULF COAST	775	700.7	721.63	730.73	739.83	748.93	759.85
Ground Water	GULF COAST	502	495.95	511.42	518.7	525.07	531.44	537.81
Ground Water	OTHER AQUIFER	229	69.3	71.37	72.27	73.17	74.07	75.15
Ground Water	OTHER AQUIFER	771	49.05	50.58	51.3	51.93	52.56	53.19
Total Supply (AF/yr)		**2298**	**1335**	**1375.12**	**1392.71**	**1409.72**	**1426.72**	**1445.3**
Projected Supply Surplus/Deficit		**1095**	**20**	**20.1179**	**19.71**	**19.7181**	**19.7173**	**19.3014**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Maverick County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		140	156	162	166	169	172	175

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	35	35	35	34	34	34	33
Ground Water	CARRIZO-WILCOX	61	55	57	59	60	61	62
Ground Water	CARRIZO-WILCOX	55	24	26	26	27	27	28
Ground Water	OTHER AQUIFER	387	53	55	56	57	58	59
Ground Water	OTHER AQUIFER	55	24	25	25	25	26	26
Total Supply (AF/yr)		**593**	**191**	**197**	**200**	**203**	**206**	**208**
Projected Supply Surplus/Deficit		**453**	**35**	**35**	**34**	**34**	**34**	**33**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Jim Hogg County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		27	33	36	37	38	39	40
Current Water Supply	**Source**							
Ground Water	GULF COAST	1,140	37	37	37	37	37	37
Ground Water	GULF COAST	160	4	4	4	4	4	4
Total Supply (AF/yr)		**1,300**	**41**	**41**	**41**	**41**	**41**	**41**
Projected Supply Surplus/Deficit		**1,273**	**8**	**5**	**4**	**3**	**2**	**1**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Hidalgo County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1196	1442	1561	1633	1704	1774	1836
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	174	183	182	181	179	177	175
Surface Water	AMISTAD/FALCON	33	23	22	21	21	21	20
Ground Water	GULF COAST	928	1,291	1,398	1,462	1,526	1,589	1,644
Ground Water	GULF COAST	272	151	163	171	178	185	192
Total Supply (AF/yr)		**1,407**	**1,648**	**1,765**	**1,835**	**1,904**	**1,972**	**2,031**
Projected Supply Surplus/Deficit		**211**	**206**	**204**	**202**	**200**	**198**	**195**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		8	6	6	6	6	6	6
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	4	4	4	4	4	4	4
Ground Water	GULF COAST	494	8	8	8	8	8	8
Total Supply (AF/yr)		**498**	**12**	**12**	**12**	**12**	**12**	**12**
Projected Supply Surplus/Deficit		**490**	**6**	**6**	**6**	**6**	**6**	**6**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	6780	13463	16864	19716	23192	27430	32598

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**21,883**	**16,216**	**16,216**	**16,216**	**16,216**	**16,216**	**16,216**
Projected Supply Surplus/Deficit	**0**	**2,753**	**-649**	**-3,501**	**-6,977**	**-11,215**	**-16,383**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	118	400
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	10,800	$ 4,484,376.00	$ 415.22		0	1,000	2,000	4,000	7,250	10,800
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:					0	0	0	0	0	0
Purchase	5,183	$ 2,813,021.42	$ 542.74		0	980	2,374	3,291	3,847	5,183
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56		0	0	0	0	0	0
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Zapata County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Willacy County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1795	1492	1190	1391	1636	1935	2300

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	2,195	1,645	1,645	1,645	1,645	1,645	1,645
Total Supply (AF/yr)		**2,195**	**1,645**	**1,645**	**1,645**	**1,645**	**1,645**	**1,645**
Projected Supply Surplus/Deficit		**400**	**153**	**455**	**254**	**9**	**-291**	**-656**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	256	$ 77,941.76	$ 304.46		0	0	0	0	91	256
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	400	$ 166,088.00	$ 415.22		0	0	0	0	200	400
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Starr County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Maverick County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Jim Hogg County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Hidalgo County

Year		**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Water Demand		3487	10355	14151	16545	19462	23018	27354
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	6,243	5,941	5,941	5,941	5,941	5,941	5,941
Surface Water	REUSE	9,856	5,040	5,040	5,040	5,040	5,040	5,040
Ground Water	GULF COAST	1,190	1,190	1,190	1,190	1,190	1,190	1,190
Total Supply (AF/yr)		**17,289**	**12,171**	**12,171**	**12,171**	**12,171**	**12,171**	**12,171**
Projected Supply Surplus/Deficit		**13,802**	**1,816**	**-1,980**	**-4,374**	**-7,291**	**-10,847**	**-15,183**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	10,000	$ 4,152,200.00	$ 415.22		0	1000	2000	4000	7000	10000
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	5,183	$ 2,813,021.42	$ 542.74		0	980	2374	3291	3847	5183
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1498	1616	1523	1780	2094	2477	2944

Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	2400	2400	2400	2400	2400	2400	2400
Total Supply (AF/yr)		**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**
Projected Supply Surplus/Deficit		**902**	**784**	**877**	**620**	**306**	**-77**	**-544**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	144	$ 43,842.24	$ 304.46		0	0	0	0	27	144
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	400	$ 166,088.00	$ 415.22		0	0	0	0	50	400
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	5,817	5,817	5,817	5,817	5,817	5,817	5,817

Current Water Supply	Source							
Total Supply (AF/yr)		**24,588**	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**
Projected Supply Surplus/Deficit		**18,771**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Zapata County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		474	474	474	474	474	474	474
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	446	0	0	0	0	0	0
Ground Water	OTHER AQUIFER	80	474	474	474	474	474	474
Total Supply (AF/yr)		**526**	**474**	**474**	**474**	**474**	**474**	**474**
Projected Supply Surplus/Deficit		**52**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Willacy County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		151	151	151	151	151	151	151

Current Water Supply	Source							
Ground Water	Gulf Coast	240	151	151	151	151	151	151
Total Supply (AF/yr)		**240**	**151**	**151**	**151**	**151**	**151**	**151**
Projected Supply Surplus/Deficit		**89**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1,513	1,513	1,513	1,513	1,513	1,513	1,513
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	313	0	0	0	0	0	0
Ground Water	GULF COAST	37	153	153	153	153	153	153
Ground Water	GULF COAST	159	21	21	21	21	21	21
Ground Water	GULF COAST	37	174	174	174	174	174	174
Ground Water	CARRIZO-WILCOX	11,170	440	440	440	440	440	440
Ground Water	CARRIZO-WILCOX	5,768	499	499	499	499	499	499
Ground Water	OTHER AQUIFER	36	73	73	73	73	73	73
Ground Water	OTHER AQUIFER	5	70	70	70	70	70	70
Ground Water	OTHER AQUIFER	39	83	83	83	83	83	83
Total Supply (AF/yr)		**17,564**	**1,513**	**1,513**	**1,513**	**1,513**	**1,513**	**1,513**
Projected Supply Surplus/Deficit		**16,051**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Starr County

Year	Source	2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1,117	1,117	1,117	1,117	1,117	1,117	1,117
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	679	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	37	0	0	0	0	0	0
Ground Water	GULF COAST	399	224	224	224	224	224	224
Ground Water	GULF COAST	259	793	793	793	793	793	793
Ground Water	OTHER AQUIFER	2	22	22	22	22	22	22
Ground Water	OTHER AQUIFER	8	78	78	78	78	78	78
Total Supply (AF/yr)		**1,384**	**1,117**	**1,117**	**1,117**	**1,117**	**1,117**	**1,117**
Projected Supply Surplus/Deficit		**267**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — Additional Supply by Decade

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Maverick County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		260	260	260	260	260	260	260

Current Water Supply	Source							
Surface Water	LIVESTOCK LOCAL SUPPLY	761	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	436	0	0	0	0	0	0
Ground Water	CARRIZO-WILCOX	95	1	1	1	1	1	1
Ground Water	CARRIZO-WILCOX	87	80	80	80	80	80	80
Ground Water	OTHER AQUIFER	141	103	103	103	103	103	103
Ground Water	OTHER AQUIFER	19	76	76	76	76	76	76
Total Supply (AF/yr)		**1,539**	**260**	**260**	**260**	**260**	**260**	**260**
Projected Supply Surplus/Deficit		**1,279**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	104	$ 56,444.96	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Jim Hogg County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		518	518	518	518	518	518	518
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	120	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	139	0	0	0	0	0	0
Ground Water	GULF COAST	636	383	383	383	383	383	383
Ground Water	GULF COAST	89	135	135	135	135	135	135
Total Supply (AF/yr)		**984**	**518**	**518**	**518**	**518**	**518**	**518**
Projected Supply Surplus/Deficit		**466**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Hidalgo County

Year	Supply	2000	2010	2020	2030	2040	2050	2060
Total Water Demand		681	681	681	681	681	681	681
Current Water Supply	**Supply**							
Surface Water	LIVESTOCK LOCAL SUPPLY	725	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	38	0	0	0	0	0	0
Ground Water	GULF COAST	71	647	647	647	647	647	647
Ground Water	GULF COAST	21	34	34	34	34	34	34
Total Supply (AF/yr)		**855**	**681**	**681**	**681**	**681**	**681**	**681**
Projected Supply Surplus/Deficit		**174**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1,103	1,103	1,103	1,103	1,103	1,103	1,103

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	73	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	826	0	0	0	0	0	0
Ground Water	GULF COAST	597	1103	1103	1103	1103	1103	1103
Total Supply (AF/yr)		**1496**	**1103**	**1103**	**1103**	**1103**	**1103**	**1103**
Projected Supply Surplus/Deficit		**393**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	6,208	7,509	8,274	8,966	9,654	10,256	11,059

Current Water Supply	Source							
Total Supply (AF/yr)		**7,517**	**6,549**	**6,552**	**6,555**	**6,558**	**6,560**	**6,563**
Projected Supply Surplus/Deficit		**0**	**-960**	**-1,722**	**-2,411**	**-3,096**	**-3,696**	**-4,496**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		1,000	1,000	1,000	1,000	1,100	1,200
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	3,020	$ 1,253,964.40	$ 415.22		811	1,245	1,638	2,027	2,464	3,020
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	304	$ 164,992.96	$ 542.74		110	110	110	110	165	304
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Zapata County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply	Source							
Total Supply (AF/yr)		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit		**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Willacy County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		25	25	25	25	25	25	25

Current Water Supply	Supple							
Surface Water	AMISTAD/FALCON	0	0	0	0	0	0	0
Surface Water*	OTHER LOCAL SUPPLY	0	0	0	0	0	0	0
Total Supply (AF/yr)		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit		**-25**	**-25**	**-25**	**-25**	**-25**	**-25**	**-25**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	15	$ 6,228.30	$ 415.22		15	15	15	15	15	15
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	10	$ 5,427.40	$ 542.74		10	10	10	10	10	10
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Webb County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	23	28	31	34	37	39	42

Current Water Supply	Supply	2000	2010	2020	2030	2040	2050	2060
Surface Water	AMISTAD/FALCON	43.4145	0	0	0	0	0	0
Ground Water	OTHER AQUIFER	4	2.74393	3.04287	3.33693	3.63274	3.82508	4.11875
Ground Water	OTHER AQUIFER	1	4.11165	4.55012	4.99202	5.43113	5.72607	6.16722
Ground Water	OTHER AQUIFER	5	21.1444	23.407	25.6711	27.9361	29.4488	31.714
Total Supply (AF/yr)		**53.4145**	**28**	**31**	**34**	**37**	**39**	**42**
Projected Supply Surplus/Deficit		**30**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Starr County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply	Source							
Total Supply (AF/yr)		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit		**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS							
Manufacturing: Maverick County							
Year	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Water Demand	56	64	69	73	77	80	85

Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	76	114	114	114	114	114	114
Total Supply (AF/yr)		**76**	**114**	**114**	**114**	**114**	**114**	**114**
Projected Supply Surplus/Deficit		**20**	**50**	**45**	**41**	**37**	**34**	**29**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Jim Hogg County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply	Source							
Total Supply (AF/yr)		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit		**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Hidalgo County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		2,674	3,236	3,559	3,851	4,143	4,403	4,742

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	3,718	3,240	3,240	3,240	3,240	3,240	3,240
Ground Water	GULF COAST	60	908	908	908	908	908	908
Ground Water	GULF COAST	17	0	0	0	0	0	0
Total Supply (AF/yr)		**3,795**	**4,148**	**4,148**	**4,148**	**4,148**	**4,148**	**4,148**
Projected Supply Surplus/Deficit		**1,121**	**912**	**589**	**297**	**5**	**-255**	**-594**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	200	$ 60,892.00	$ 304.46		0	0	0	0	100	200
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	200	$ 83,044.00	$ 415.22		0	0	0	0	100	200
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	194	$ 105,291.56	$ 542.74		0	0	0	0	55	194
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

912	589	297	5	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		3,430	4,156	4,590	4,983	5,372	5,709	6,165
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	1,354	20	20	20	20	20	20
Surface Water	INDIRECT REUSE	2,239	2,240	2,240	2,240	2,240	2,240	2,240
Total Supply (AF/yr)		**3,593**	**2,260**	**2,260**	**2,260**	**2,260**	**2,260**	**2,260**
Projected Supply Surplus/Deficit		**163**	**-1,896**	**-2,330**	**-2,723**	**-3,112**	**-3,449**	**-3,905**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		1,000	1000	1000	1000	1000	1000
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	2,805	$ 1,164,692.10	$ 415.22		796	1230	1623	2012	2349	2805
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	100	$ 54,274.00	$ 542.74		100	100	100	100	100	100
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

0 0 0 0 0 0

DBWUGI	wug_name	wug_rwpg	wug_basi	wug_county	city_id	PCS_2010	PCS_2020	PCS_2030	PCS_2040	PCS_2050	PCS_2060	CNWD_2010	CNWD_2020	CNWD_203(	CNWD_204	CNWD_20	CNWD_2060
2544	BROWNSVILLE	M	N-RG	CAMERON	0080	966.94	1869.22	3027.98	3801.12	4657.38	5170.53	43319	51637	60009	68737	77384	85910
2545	BROWNSVILLE	M	RG	CAMERON	0080	7.5	14.51	23.5	29.49	36.14	40.12	336	401	466	533	601	667
2546	COMBES	M	N-RG	CAMERON	0690	17.3	36.85	52.24	70.23	84.79	93.5	208	229	256	281	309	341
2587	COUNTY-OTHER	M	N-RG	CAMERON	0757	252.08	462.12	653.62	875.23	1046.65	1140.3	6957	7798	8693	9555	10466	11403
2588	COUNTY-OTHER	M	RG	CAMERON	0757	0.46	0.84	1.19	1.59	1.89	2.07	13	14	16	17	19	21
3759	EAST RIO HONDO WSC	M	N-RG	CAMERON	4099	111.48	236.75	334.25	491.25	574	652.71	2408	3107	3862	4555	5323	6052
3761	EL JARDIN	M	N-RG	CAMERON	4103	60.48	120.48	181.26	233	290.87	325.75	1899	2319	2755	3198	3636	4072
3762	EL JARDIN	M	RG	CAMERON	4103	0.34	0.68	1.03	1.32	1.64	1.84	11	13	16	18	20	23
2553	HARLINGEN	M	N-RG	CAMERON	0265	299.32	600.43	970.87	1300.37	1555.37	1694.84	11374	12780	14175	15604	17109	18643
3754	INDIAN LAKE	M	N-RG	CAMERON	1026	3.13	6.79	10.47	13.56	17.04	19.06	49	57	66	76	85	95
2622	IRRIGATION	M	N-RG	CAMERON	1004							153281	144873	135181	135181	135181	135181
2623	IRRIGATION	M	RG	CAMERON	1004							6387	6036	5633	5633	5633	5633
2556	LA FERIA	M	N-RG	CAMERON	0333	53.46	99.78	146.73	187	231.77	259.52	855	1031	1214	1403	1587	1777
3764	LAGUNA MADRE WD	M	N-RG	CAMERON	4224	34.61	76.67	102.26	149.06	178.82	207.13	2310	3386	4516	5622	6744	7812
2560	LAGUNA VISTA	M	N-RG	CAMERON	0788	12.18	27.41	40.44	51.67	64.16	71.94	268	323	382	444	503	564
2633	LIVESTOCK	M	N-RG	CAMERON	1005							1048	1048	1048	1048	1048	1048
2634	LIVESTOCK	M	RG	CAMERON	1005							55	55	55	55	55	55
2562	LOS FRESNOS	M	N-RG	CAMERON	0369	29.79	59.87	100.75	136.81	160.28	182.61	767	1008	1247	1490	1745	1988
3755	LOS INDIOS	M	N-RG	CAMERON	1040	7.94	15.26	24.61	30.78	37.61	41.68	230	271	311	354	396	439
2602	MANUFACTURING	M	N-RG	CAMERON	1001							4156	4590	4983	5372	5709	6165
3765	MILITARY HIGHWAY WSC	M	N-RG	CAMERON	4255	63.16	124.22	203.71	258.03	318.32	355.21	1465	1755	2037	2344	2645	2951
3766	MILITARY HIGHWAY WSC	M	RG	CAMERON	4255	0.91	1.78	2.92	3.7	4.56	5.08	21	25	29	34	38	42
2609	MINING	M	N-RG	CAMERON	1003							6	6	6	6	6	6
3771	OLMITO WSC	M	N-RG	CAMERON	4292	40.67	80	118.68	164.07	194.64	223.71	952	1314	1691	2060	2444	2809
2567	PALM VALLEY	M	N-RG	CAMERON	0793	7.85	13.55	20.02	27.26	31.1	32.92	413	440	468	494	525	555
3772	PALM VALLEY ESTATES UD	M	N-RG	CAMERON	4295	1.54	3.48	5.51	8.01	9.28	10.49	85	108	132	155	180	203
2570	PORT ISABEL	M	N-RG	CAMERON	0477	23.67	44.87	69.21	96.59	111.15	117.93	2645	2846	3052	3254	3470	3681
2571	PRIMERA	M	N-RG	CAMERON	0735	23.18	42.51	67.36	84.49	103.39	115.2	525	628	730	838	945	1053
2573	RANCHO VIEJO	M	N-RG	CAMERON	0943	11.94	28.45	41.43	56.61	66.61	76.12	373	496	627	755	888	1015
2576	RIO HONDO	M	N-RG	CAMERON	0503	11.75	20.28	29.99	40.84	46.61	49.33	404	428	453	475	503	533
2578	SAN BENITO	M	N-RG	CAMERON	0532	120.63	239.93	385.33	513.33	611.29	663.79	4916	5484	6050	6630	7241	7863
2581	SANTA ROSA	M	N-RG	CAMERON	0541	19.45	41.82	59.72	80.72	97.86	108.25	331	376	429	478	531	588
2583	SOUTH PADRE ISLAND	M	N-RG	CAMERON	0805	21.53	40.61	60.14	77.05	95.86	107.64	2504	3136	3789	4443	5095	5722
2606	STEAM ELECTRIC POWER	M	N-RG	CAMERON	1002							1616	1523	1780	2094	2477	2944
3775	VALLEY MUD #2	M	N-RG	CAMERON	4369	3.58	7.16	10.75	14.33	16.72	16.72	734	731	727	724	721	721
3776	VALLEY MUD #2	M	RG	CAMERON	4369	0.6	1.21	1.81	2.42	2.82	2.82	124	123	123	122	122	122
2542	ALAMO	M	N-RG	HIDALGO	0003	93.71	220.39	364.57	502.72	609.36	718.75	2319	3022	3808	4675	5667	6684
2543	ALTON	M	N-RG	HIDALGO	0675	55.3	121.64	192.19	256.59	333.96	387.03	3346	4153	5061	6056	7135	8268
2589	COUNTY-OTHER	M	N-RG	HIDALGO	0757	424.61	922.64	1493.86	2048.57	2491.34	2945.55	9341	12340	15686	19368	23554	27849
2590	COUNTY-OTHER	M	RG	HIDALGO	0757	24.77	54.7	89.48	123.54	150.96	179.11	545	732	940	1168	1427	1693
2547	DONNA	M	N-RG	HIDALGO	0168	75.08	149.61	242.87	329.3	401.53	447.47	2309	2565	2842	3156	3521	3924
2549	EDCOUCH	M	N-RG	HIDALGO	0178	21.16	43.22	65.3	85.86	103.32	114.94	499	547	604	668	744	828
2550	EDINBURG	M	N-RG	HIDALGO	0182	362.88	751.56	1060.93	1581.57	1892.73	2211.93	8274	10428	12967	15528	18583	21717
2552	ELSA	M	N-RG	HIDALGO	0190	19.62	48.42	73.4	101.38	116.17	123.35	1099	1134	1182	1232	1303	1383
2555	HIDALGO	M	N-RG	HIDALGO	0275	47.81	100.28	176.37	250.35	307.07	365.26	1016	1387	1786	2225	2729	3247
3750	HIDALGO	M	RG	HIDALGO	0275	1.96	4.12	7.25	10.29	12.62	15.01	42	57	73	91	112	133
3763	HIDALGO COUNTY MUD #1	M	N-RG	HIDALGO	4204	29.57	66.99	100.17	141.12	173.68	207.08	1703	2387	3161	3994	4915	5860
2624	IRRIGATION	M	N-RG	HIDALGO	1004							525051	471394	403500	403500	403500	403500
2625	IRRIGATION	M	RG	HIDALGO	1004							21309	19131	16376	16376	16376	16376
2558	LA JOYA	M	RG	HIDALGO	0336	6.59	12.59	20.47	28.22	35.13	39.99	121	140	160	182	208	237
3751	LA JOYA	M	N-RG	HIDALGO	0336	15.59	29.77	48.37	66.69	83.02	94.5	287	331	378	431	492	560
2559	LA VILLA	M	N-RG	HIDALGO	0349	5.85	10.23	14.62	19	21.93	21.93	234	230	225	221	218	218
2635	LIVESTOCK	M	N-RG	HIDALGO	1005							647	647	647	647	647	647
2636	LIVESTOCK	M	RG	HIDALGO	1005							34	34	34	34	34	34
2603	MANUFACTURING	M	N-RG	HIDALGO	1001							3236	3559	3851	4143	4403	4742
2564	MCALLEN	M	N-RG	HIDALGO	0376	571.01	1362.32	2011.35	2814.13	3522.53	4008.68	28693	33547	39221	45261	52025	59205
3752	MCALLEN	M	RG	HIDALGO	0376	0.08	0.18	0.27	0.38	0.47	0.52	4	4	5	6	7	8
2565	MERCEDES	M	N-RG	HIDALGO	0397	65.17	139.75	206.63	282.92	326.45	350.38	1890	1956	2048	2142	2285	2453
3767	MILITARY HIGHWAY WSC	M	N-RG	HIDALGO	4255	57.47	107.96	173.12	217.97	270.59	305.93	1333	1525	1731	1980	2248	2542
3768	MILITARY HIGHWAY WSC	M	RG	HIDALGO	4255	0.58	1.08	1.74	2.19	2.72	3.07	13	15	17	20	23	26
2610	MINING	M	N-RG	HIDALGO	1003							1291	1398	1462	1526	1589	1644
2611	MINING	M	RG	HIDALGO	1003							151	163	171	178	185	192
2566	MISSION	M	N-RG	HIDALGO	0408	342.51	712.87	1121.9	1645.99	1973.34	2309.15	9864	12564	15594	18792	22529	26363
3769	NORTH ALAMO WSC	M	N-RG	HIDALGO	4273	641.5	1377.96	2214.67	3022.03	3661.94	4318.38	11675	15158	19046	23352	28297	33369
3756	PALMHURST	M	N-RG	HIDALGO	1051	10.24	15.83	22.1	28.87	36.27	43.87	1157	1789	2497	3263	4099	4957
2568	PALMVIEW	M	N-RG	HIDALGO	0794	28.04	58.95	90.85	131.12	160.93	191.52	869	1199	1570	1967	2414	2873
3757	PENITAS	M	N-RG	HIDALGO	1052	4.04	8.34	14.39	19.41	21.72	22.57	149	150	150	151	155	161
2569	PHARR	M	N-RG	HIDALGO	0463	333.64	669	1025.53	1353.35	1744.8	2020.17	8474	10370	12511	14887	17448	20202
2572	PROGRESO	M	N-RG	HIDALGO	0941	21.33	45.35	78.85	109.11	129.86	151.14	576	717	867	1037	1234	1436
2579	SAN JUAN	M	N-RG	HIDALGO	0536	218.84	484.64	794.09	1097.62	1342.4	1593.51	3501	4665	5956	7384	9031	10720
3774	SHARYLAND WSC	M	N-RG	HIDALGO	4333	142.86	285.71	465.29	685.24	891.94	995.83	4893	5469	6095	6747	7492	8365
2607	STEAM ELECTRIC POWER	M	N-RG	HIDALGO	1002							10355	14151	16545	19462	23018	27354
2584	SULLIVAN CITY	M	RG	HIDALGO	0966	30.96	65.55	93.93	141.49	170.64	200.55	526	672	845	1016	1226	1440
2585	WESLACO	M	N-RG	HIDALGO	0638	172.94	357.73	546.34	724.96	879.22	984.34	5534	6201	6966	7819	8792	9843
2591	COUNTY-OTHER	M	N-RG	JIM HOGG	0757	3.33	7.13	10.31	13.64	14.47	13.93	137	143	147	150	148	142
2592	COUNTY-OTHER	M	RG	JIM HOGG	0757	0.38	0.82	1.17	1.55	1.65	1.58	16	16	17	17	17	16
2554	HEBBRONVILLE	M	N-RG	JIM HOGG	0268	16.01	39.97	59.97	81.1	86.39	83.15	731	759	780	792	778	748
2626	IRRIGATION	M	N-RG	JIM HOGG	1004							794	766	744	744	744	744
2637	LIVESTOCK	M	N-RG	JIM HOGG	1005							383	383	383	383	383	383
2638	LIVESTOCK	M	RG	JIM HOGG	1005							135	135	135	135	135	135
2612	MINING	M	N-RG	JIM HOGG	1003							33	36	37	38	39	40
2593	COUNTY-OTHER	M	NUECES	MAVERICK	0757	0.22	0.46	0.7	0.87	1.06	1.13	5	6	7	8	9	9
2594	COUNTY-OTHER	M	RG	MAVERICK	0757	112.24	241.53	365.38	458.79	557.82	600.95	2722	3243	3735	4175	4564	4917
2548	EAGLE PASS	M	RG	MAVERICK	0173	79.98	198.12	298.56	405.64	454.09	468.09	4932	5123	5314	5460	5644	5818
3760	EL INDIO WSC	M	RG	MAVERICK	4102	39.17	69.43	107.01	135.99	166.78	180.73	1253	1567	1855	2108	2335	2530
2627	IRRIGATION	M	NUECES	MAVERICK	1004							4213	4055	3874	3874	3874	3874
2628	IRRIGATION	M	RG	MAVERICK	1004							98542	94844	90612	90612	90612	90612
2639	LIVESTOCK	M	NUECES	MAVERICK	1005							104	104	104	104	104	104
2640	LIVESTOCK	M	RG	MAVERICK	1005							156	156	156	156	156	156
2604	MANUFACTURING	M	RG	MAVERICK	1001							64	69	73	77	80	85
2613	MINING	M	NUECES	MAVERICK	1003							108	112	115	117	119	121
2614	MINING	M	RG	MAVERICK	1003							48	50	51	52	53	54
2595	COUNTY-OTHER	M	N-RG	STARR	0757	6.59	14.47	22.52	29.39	37.08	41.62	242	298	355	414	472	530
2596	COUNTY-OTHER	M	RG	STARR	0757	162.9	358	556.86	726.89	916.84	1029.36	5986	7365	8786	10249	11669	13101
2629	IRRIGATION	M	RG	STARR	1004							9605	9182	8777	8777	8777	8777
2557	LA GRULLA	M	RG	STARR	0335	4.07	8.14	12.21	16.28	18.99	18.99	639	635	631	627	624	624
2641	LIVESTOCK	M	N-RG	STARR	1005							246	246	246	246	246	246
2642	LIVESTOCK	M	RG	STARR	1005							871	871	871	871	871	871
2615	MINING	M	N-RG	STARR	1003							770	793	803	813	823	835
2616	MINING	M	RG	STARR	1003							545	562	570	577	584	591
2575	RIO GRANDE CITY	M	RG	STARR	0502	58.52	127.94	173.95	244.51	282.83	301.55	2575	2751	2957	3141	3353	3576
3773	RIO WSC	M	RG	STARR	4319	13.18	30.33	43.2	64.77	75.37	85.56	484	624	772	913	1063	1206
2577	ROMA CITY	M	RG	STARR	0515	62.15	127.81	192.3	250.1	295.15	321.22	2722	3053	3397	3751	4112	4476
2597	COUNTY-OTHER	M	NUECES	WEBB	0757	3.36	7.82	12.44	16.88	20.75	23.46	136	155	175	199	225	255
2598	COUNTY-OTHER	M	N-RG	WEBB	0757	5.03	11.7	18.61	25.26	31.07	35.14	204	231	262	297	337	382
2599	COUNTY-OTHER	M	RG	WEBB	0757	25.88	60.18	95.7	129.94	159.75	180.69	1048	1189	1349	1529	1734	1962
2551	EL CENIZO	M	RG	WEBB	0770	26.57	58.67	93.03	137.24	171.02	206.72	671	968	1302	1664	2074	2506
2630	IRRIGATION	M	RG	WEBB	1004							3902	3678	3469	3469	3469	3469
2561	LAREDO	M	RG	WEBB	0347	1050.35	2709.65	4239.39	5694.74	7442.28	8741.38	51467	65032	80548	97846	116596	136948
2643	LIVESTOCK	M	NUECES	WEBB	1005							666	666	666	666	666	666
2644	LIVESTOCK	M	N-RG	WEBB	1005							91	91	91	91	91	91
2645	LIVESTOCK	M	RG	WEBB	1005							756	756	756	756	756	756
2605	MANUFACTURING	M	RG	WEBB	1001							28	31	34	37	39	42
2617	MINING	M	NUECES	WEBB	1003							546	541	539	539	538	536
2618	MINING	M	N-RG	WEBB	1003							419	415	414	413	412	410
2619	MINING	M	RG	WEBB	1003							239	236	236	235	235	234
3758	RIO BRAVO	M	RG	WEBB	1055	46.59	90.69	153.27	215.12	264.12	315.87	1090	1490	1924	2409	2958	3538
2608	STEAM ELECTRIC POWER	M	RG	WEBB	1002							1492	1190	1391	1636	1935	2300
3777	WEBB COUNTY WATER UTILITY	M	RG	WEBB	4376	7.43	14.77	25.29	35.81	44.23	53.13	239	336	441	559	690	829
2600	COUNTY-OTHER	M	N-RG	WILLACY	0757	1.29	2.59	3.88	5.18	6.04	6.02	215	213	212	211	210	209
2631	IRRIGATION	M	N-RG	WILLACY	1004							27322	27796	27993	27993	27993	27993
2646	LIVESTOCK	M	N-RG	WILLACY	1005							151	151	151	151	151	151
2563	LYFORD	M	N-RG	WILLACY	0373	9.37	17.31	25.91	34.92	38.52	38.97	297	307	313	317	322	326
3831	MANUFACTURING	M	N-RG	WILLACY	1001							25	25	25	25	25	25
2620	MINING	M	N-RG	WILLACY	1003							6	6	6	6	6	6
3770	NORTH ALAMO WSC	M	N-RG	WILLACY	4273	40.25	77.5	111.8	136.18	145.16	149.6	733	853	961	1052	1122	1156
2574	RAYMONDVILLE	M	N-RG	WILLACY	0495	45.12	81.56	119.9	159.41	174.26	175.54	1681	1701	1715	1717	1730	1743
2580	SAN PERLITA	M	N-RG	WILLACY	0956	3.35	6.37	9.76	13.38	14.93	15.18	105	112	117	120	124	126
3778	SEBASTIAN MUD	M	N-RG	WILLACY	4410	11.41	24.72	38.04	49.15	56.12	57.83	256	297	333	362	382	393
2601	COUNTY-OTHER	M	RG	ZAPATA	0757	20.54	38.18	60.75	87.54	98	105.72	1232	1514	1792	2048	2293	2474
2632	IRRIGATION	M	RG	ZAPATA	1004							2149	2036	1929	1929	1929	1929
2647	LIVESTOCK	M	RG	ZAPATA	1005							474	474	474	474	474	474
2621	MINING	M	RG	ZAPATA	1003							24	23	23	23	23	23
2586	ZAPATA	M	RG	ZAPATA	0672	16.32	32.64	48.95	65.27	76.15	76.15	1033	1017	1001	985	974	974

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2544	BROWNSVILLE	M	N-RG	CAMERON	0080	138646	172646	208591	245746	282785	319834	355073
2545	BROWNSVILLE	M	RG	CAMERON	0080	1076	1340	1619	1907	2194	2482	2755
2546	COMBES	M	N-RG	CAMERON	0690	2553	3089	3655	4240	4823	5407	5962
2587	COUNTY-OTHER	M	N-RG	CAMERON	0757	38801	45008	51569	58351	65113	71876	78307
2588	COUNTY-OTHER	M	RG	CAMERON	0757	71	82	94	106	118	130	142
3759	EAST RIO HONDO WSC	M	N-RG	CAMERON	4099	13741	19904	26420	33155	39869	46585	52973
3761	EL JARDIN	M	N-RG	CAMERON	4103	8294	10798	13445	16182	18910	21639	24234
3762	EL JARDIN	M	RG	CAMERON	4103	47	61	76	92	107	122	137
2553	HARLINGEN	M	N-RG	CAMERON	0265	57564	66805	76575	86674	96741	106811	116389
3754	INDIAN LAKE	M	N-RG	CAMERON	1026	541	699	866	1039	1211	1383	1547
2556	LA FERIA	M	N-RG	CAMERON	0333	6115	7954	9898	11908	13912	15916	17822
3764	LAGUNA MADRE WD	M	N-RG	CAMERON	4224	4242	7725	11408	15215	19010	22806	26416
2560	LAGUNA VISTA	M	N-RG	CAMERON	0788	1658	2174	2719	3282	3844	4406	4940
2562	LOS FRESNOS	M	N-RG	CAMERON	0369	4512	6649	8908	11243	13571	15899	18114
3755	LOS INDIOS	M	N-RG	CAMERON	1040	1149	1418	1703	1997	2290	2583	2862
3765	MILITARY HIGHWAY WSC	M	N-RG	CAMERON	4255	8834	11278	13862	16533	19196	21860	24393
3766	MILITARY HIGHWAY WSC	M	RG	CAMERON	4255	127	162	199	237	275	313	349
3771	OLMITO WSC	M	N-RG	CAMERON	4292	4479	7261	10203	13244	16275	19307	22191
2567	PALM VALLEY	M	N-RG	CAMERON	0793	1298	1402	1512	1625	1738	1851	1959
3772	PALM VALLEY ESTATES UD	M	N-RG	CAMERON	4295	250	344	444	547	650	753	851
2570	PORT ISABEL	M	N-RG	CAMERON	0477	4865	5282	5723	6179	6633	7088	7520
2571	PRIMERA	M	N-RG	CAMERON	0735	2723	3449	4217	5011	5802	6593	7346
2573	RANCHO VIEJO	M	N-RG	CAMERON	0943	1754	2665	3628	4623	5615	6607	7551
2576	RIO HONDO	M	N-RG	CAMERON	0503	1942	2098	2263	2434	2604	2774	2936
2578	SAN BENITO	M	N-RG	CAMERON	0532	23444	26922	30599	34400	38189	41979	45584
2581	SANTA ROSA	M	N-RG	CAMERON	0541	2833	3472	4148	4847	5543	6240	6903
2583	SOUTH PADRE ISLAND	M	N-RG	CAMERON	0805	2422	3203	4028	4881	5732	6583	7392
3775	VALLEY MUD #2	M	N-RG	CAMERON	4369	1066	1066	1066	1066	1066	1066	1066
3776	VALLEY MUD #2	M	RG	CAMERON	4369	180	180	180	180	180	180	180
2542	ALAMO	M	N-RG	HIDALGO	0003	14760	20915	28107	36163	44880	54400	64166
2543	ALTON	M	N-RG	HIDALGO	0675	4384	12342	15513	19064	22907	27104	31411
2589	COUNTY-OTHER	M	N-RG	HIDALGO	0757	57825	75813	102960	133363	166259	202193	239056
2590	COUNTY-OTHER	M	RG	HIDALGO	0757	2983	4422	6104	7988	10026	12252	14536
2547	DONNA	M	N-RG	HIDALGO	0168	14768	16757	19080	21682	24498	27574	30729
2549	EDCOUCH	M	N-RG	HIDALGO	0178	3342	3778	4287	4858	5475	6149	6841
2550	EDINBURG	M	N-RG	HIDALGO	0182	48465	64792	83869	105237	128358	153611	179517
2552	ELSA	M	N-RG	HIDALGO	0190	5549	5838	6175	6553	6962	7408	7866
2555	HIDALGO	M	N-RG	HIDALGO	0275	7033	10671	14921	19682	24833	30459	36231
3750	HIDALGO	M	RG	HIDALGO	0275	289	438	613	809	1021	1252	1489
3763	HIDALGO COUNTY MUD #1	M	N-RG	HIDALGO	4204	3400	5280	7476	9936	12598	15505	18487
2558	LA JOYA	M	RG	HIDALGO	0336	982	1177	1405	1661	1938	2240	2550
3751	LA JOYA	M	N-RG	HIDALGO	0336	2321	2783	3322	3926	4580	5294	6026
2559	LA VILLA	M	N-RG	HIDALGO	0349	1305	1305	1305	1305	1305	1305	1305
2564	MCALLEN	M	N-RG	HIDALGO	0376	106400	127441	152025	179562	209358	241901	275286
3752	MCALLEN	M	RG	HIDALGO	0376	14	17	20	24	28	32	36
2565	MERCEDES	M	N-RG	HIDALGO	0397	13649	14546	15595	16770	18041	19429	20853
3767	MILITARY HIGHWAY WSC	M	N-RG	HIDALGO	4255	8731	10261	12048	14050	16216	18582	21009
3768	MILITARY HIGHWAY WSC	M	RG	HIDALGO	4255	88	103	121	141	163	187	211
2566	MISSION	M	N-RG	HIDALGO	0408	45408	61154	79551	100157	122454	146807	171790
3769	NORTH ALAMO WSC	M	N-RG	HIDALGO	4273	80960	114538	153770	197713	245263	297197	350473
3756	PALMHURST	M	N-RG	HIDALGO	1051	4872	9144	14136	19727	25777	32384	39162
2568	PALMVIEW	M	N-RG	HIDALGO	0794	4107	6258	8771	11586	14632	17959	21372
3757	PENITAS	M	N-RG	HIDALGO	1052	1167	1201	1241	1285	1333	1385	1439
2569	PHARR	M	N-RG	HIDALGO	0463	46660	59571	74656	91553	109836	129805	150291
2572	PROGRESO	M	N-RG	HIDALGO	0941	4851	6348	8097	10056	12176	14491	16866
2579	SAN JUAN	M	N-RG	HIDALGO	0536	26229	39074	54082	70892	89081	108947	129327
3774	SHARYLAND WSC	M	N-RG	HIDALGO	4333	27988	31885	36438	41538	47057	53085	59268
2584	SULLIVAN CITY	M	RG	HIDALGO	0966	3998	5528	7315	9317	11483	13849	16276
2585	WESLACO	M	N-RG	HIDALGO	0638	26935	30878	35485	40645	46229	52328	58584
2591	COUNTY-OTHER	M	N-RG	JIM HOGG	0757	703	744	796	837	870	861	829
2592	COUNTY-OTHER	M	RG	JIM HOGG	0757	80	85	91	95	99	98	94
2554	HEBBRONVILLE	M	N-RG	JIM HOGG	0268	4498	4764	5098	5354	5569	5509	5302
2593	COUNTY-OTHER	M	NUECES	MAVERICK	0757	37	48	59	69	78	86	92
2594	COUNTY-OTHER	M	RG	MAVERICK	0757	19612	25050	30803	36243	40958	45272	48772
2548	EAGLE PASS	M	RG	MAVERICK	0173	22413	23800	25267	26654	27856	28956	29849
3760	EL INDIO WSC	M	RG	MAVERICK	4102	5235	6994	8855	10615	12140	13536	14668
2595	COUNTY-OTHER	M	N-RG	STARR	0757	1118	1470	1846	2234	2624	3009	3378
2596	COUNTY-OTHER	M	RG	STARR	0757	27652	36356	45658	55237	64893	74409	83541
2557	LA GRULLA	M	RG	STARR	0335	1211	1211	1211	1211	1211	1211	1211
2575	RIO GRANDE CITY	M	RG	STARR	0502	11923	13061	14277	15529	16791	18035	19229
3773	RIO WSC	M	RG	STARR	4319	2076	2942	3868	4821	5782	6729	7638
2577	ROMA CITY	M	RG	STARR	0515	9617	11097	12678	14306	15948	17566	19118
2597	COUNTY-OTHER	M	NUECES	WEBB	0757	646	751	873	1010	1159	1323	1496
2598	COUNTY-OTHER	M	N-RG	WEBB	0757	968	1123	1306	1510	1735	1981	2241
2599	COUNTY-OTHER	M	RG	WEBB	0757	4978	5777	6716	7767	8923	10187	11522
2551	EL CENIZO	M	RG	WEBB	0770	3545	5929	8729	11865	15315	19085	23068
2561	LAREDO	M	RG	WEBB	0347	176576	234423	302377	378468	462176	553670	650317
3758	RIO BRAVO	M	RG	WEBB	1055	5553	8318	11566	15203	19205	23579	28199
3777	WEBB COUNTY WATER UTILITY	M	RG	WEBB	4376	851	1326	1884	2509	3197	3949	4743
2600	COUNTY-OTHER	M	N-RG	WILLACY	0757	385	385	385	385	385	385	384
2563	LYFORD	M	N-RG	WILLACY	0373	1973	2091	2207	2313	2398	2456	2485
3770	NORTH ALAMO WSC	M	N-RG	WILLACY	4273	5696	7187	8649	9981	11052	11781	12141
2574	RAYMONDVILLE	M	N-RG	WILLACY	0495	9733	10071	10402	10704	10947	11112	11194
2580	SAN PERLITA	M	N-RG	WILLACY	0956	680	747	812	871	919	952	968
3778	SEBASTIAN MUD	M	N-RG	WILLACY	4410	1615	2038	2452	2830	3134	3340	3442
2601	COUNTY-OTHER	M	RG	ZAPATA	0757	7326	9169	11361	13559	15630	17498	18877
2586	ZAPATA	M	RG	ZAPATA	0672	4856	4856	4856	4856	4856	4856	4856

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2544	BROWNSVILLE	M	N-RG	CAMERON	0080	35564	44286	53506	63037	72538	82042	91081	
2545	BROWNSVILLE	M	RG	CAMERON	0080	276	344	415	489	563	637	707	
2546	COMBES	M	N-RG	CAMERON	0690	186	225	266	309	351	394	434	
2587	COUNTY-OTHER	M	N-RG	CAMERON	0757	6215	7209	8260	9347	10430	11513	12543	
2588	COUNTY-OTHER	M	RG	CAMERON	0757	11	13	15	17	19	21	23	
3759	EAST RIO HONDO WSC	M	N-RG	CAMERON	4099	1739	2519	3344	4197	5046	5897	6705	
3761	EL JARDIN	M	N-RG	CAMERON	4103	1505	1959	2440	2936	3431	3927	4398	
3762	EL JARDIN	M	RG	CAMERON	4103	9	11	14	17	19	22	25	
2553	HARLINGEN	M	N-RG	CAMERON	0265	10059	11674	13381	15146	16905	18664	20338	
3754	INDIAN LAKE	M	N-RG	CAMERON	1026	40	52	64	77	90	102	114	
2622	IRRIGATION	M	N-RG	CAMERON	1004	160435	153281	144873	135181	135181	135181	135181	
2623	IRRIGATION	M	RG	CAMERON	1004	6685	6387	6036	5633	5633	5633	5633	
2556	LA FERIA	M	N-RG	CAMERON	0333	699	909	1131	1361	1590	1818	2036	
3764	LAGUNA MADRE WD	M	N-RG	CAMERON	4224	1288	2345	3463	4619	5771	6923	8019	
2560	LAGUNA VISTA	M	N-RG	CAMERON	0788	214	280	350	423	495	568	636	
2633	LIVESTOCK	M	N-RG	CAMERON	1005	1048	1048	1048	1048	1048	1048	1048	
2634	LIVESTOCK	M	RG	CAMERON	1005	55	55	55	55	55	55	55	
2562	LOS FRESNOS	M	N-RG	CAMERON	0369	541	797	1068	1348	1627	1906	2171	
3755	LOS INDIOS	M	N-RG	CAMERON	1040	193	238	286	336	385	434	481	
2602	MANUFACTURING	M	N-RG	CAMERON	1001	3430	4156	4590	4983	5372	5709	6165	
3765	MILITARY HIGHWAY WSC	M	N-RG	CAMERON	4255	1197	1529	1879	2241	2602	2963	3306	
3766	MILITARY HIGHWAY WSC	M	RG	CAMERON	4255	17	22	27	32	37	42	47	
2609	MINING	M	N-RG	CAMERON	1003	8	6	6	6	6	6	6	
3771	OLMITO WSC	M	N-RG	CAMERON	4292	612	992	1394	1810	2224	2638	3033	
2567	PALM VALLEY	M	N-RG	CAMERON	0793	390	421	454	488	522	556	588	
3772	PALM VALLEY ESTATES UD	M	N-RG	CAMERON	4295	63	86	111	137	163	189	214	
2570	PORT ISABEL	M	N-RG	CAMERON	0477	2458	2668	2891	3122	3351	3581	3799	
2571	PRIMERA	M	N-RG	CAMERON	0735	433	549	671	797	923	1049	1168	
2573	RANCHO VIEJO	M	N-RG	CAMERON	0943	253	385	524	668	811	955	1091	
2576	RIO HONDO	M	N-RG	CAMERON	0503	385	416	449	483	516	550	582	
2578	SAN BENITO	M	N-RG	CAMERON	0532	4386	5036	5724	6435	7144	7853	8527	
2581	SANTA ROSA	M	N-RG	CAMERON	0541	286	350	418	489	559	629	696	
2583	SOUTH PADRE ISLAND	M	N-RG	CAMERON	0805	1910	2526	3176	3849	4520	5191	5829	
2606	STEAM ELECTRIC POWER	M	N-RG	CAMERON	1002	1498	1616	1523	1780	2094	2477	2944	
3775	VALLEY MUD #2	M	N-RG	CAMERON	4369	738	738	738	738	738	738	738	
3776	VALLEY MUD #2	M	RG	CAMERON	4369	125	125	125	125	125	125	125	
2542	ALAMO	M	N-RG	HIDALGO	0003	1703	2413	3243	4172	5178	6276	7403	
2543	ALTON	M	N-RG	HIDALGO	0675	1208	3401	4275	5253	6312	7469	8655	
2589	COUNTY-OTHER	M	N-RG	HIDALGO	0757	7449	9766	13263	17179	21417	26046	30794	
2590	COUNTY-OTHER	M	RG	HIDALGO	0757	384	570	786	1029	1292	1578	1872	
2547	DONNA	M	N-RG	HIDALGO	0168	2101	2384	2714	3084	3485	3923	4371	
2549	EDCOUCH	M	N-RG	HIDALGO	0178	460	521	591	669	754	847	943	
2550	EDINBURG	M	N-RG	HIDALGO	0182	6460	8637	11179	14028	17110	20476	23929	
2552	ELSA	M	N-RG	HIDALGO	0190	1063	1118	1183	1255	1334	1419	1507	
2555	HIDALGO	M	N-RG	HIDALGO	0275	701	1064	1488	1962	2476	3037	3612	
3750	HIDALGO	M	RG	HIDALGO	0275	29	44	61	81	102	125	148	
3763	HIDALGO COUNTY MUD #1	M	N-RG	HIDALGO	4204	1116	1733	2454	3261	4135	5089	6067	
2624	IRRIGATION	M	N-RG	HIDALGO	1004	570471	525051	471394	403500	403500	403500	403500	
2625	IRRIGATION	M	RG	HIDALGO	1004	23152	21309	19131	16376	16376	16376	16376	
2558	LA JOYA	M	RG	HIDALGO	0336	107	128	153	180	211	243	277	
3751	LA JOYA	M	N-RG	HIDALGO	0336	252	302	361	427	498	575	655	
2559	LA VILLA	M	N-RG	HIDALGO	0349	240	240	240	240	240	240	240	
2635	LIVESTOCK	M	N-RG	HIDALGO	1005	647	647	647	647	647	647	647	
2636	LIVESTOCK	M	RG	HIDALGO	1005	34	34	34	34	34	34	34	
2603	MANUFACTURING	M	N-RG	HIDALGO	1001	2674	3236	3559	3851	4143	4403	4742	
2564	MCALLEN	M	N-RG	HIDALGO	0376	24433	29264	34909	41233	48075	55548	63214	
3752	MCALLEN	M	RG	HIDALGO	0376	3	4	5	6	6	7	8	
2565	MERCEDES	M	N-RG	HIDALGO	0397	1835	1955	2096	2254	2425	2612	2803	
3767	MILITARY HIGHWAY WSC	M	N-RG	HIDALGO	4255	1183	1391	1633	1904	2198	2519	2848	
3768	MILITARY HIGHWAY WSC	M	RG	HIDALGO	4255	12	14	16	19	22	25	29	
2610	MINING	M	N-RG	HIDALGO	1003	1071	1291	1398	1462	1526	1589	1644	
2611	MINING	M	RG	HIDALGO	1003	125	151	163	171	178	185	192	
2566	MISSION	M	N-RG	HIDALGO	0408	7579	10207	13277	16716	20438	24502	28672	
3769	NORTH ALAMO WSC	M	N-RG	HIDALGO	4273	8706	12317	16535	21261	26374	31959	37688	
3756	PALMHURST	M	N-RG	HIDALGO	1051	622	1168	1805	2519	3292	4135	5001	
2568	PALMVIEW	M	N-RG	HIDALGO	0794	589	897	1258	1661	2098	2575	3064	
3757	PENITAS	M	N-RG	HIDALGO	1052	149	153	158	164	170	177	184	
2569	PHARR	M	N-RG	HIDALGO	0463	6899	8808	11039	13537	16240	19193	22222	
2572	PROGRESO	M	N-RG	HIDALGO	0941	456	597	762	946	1146	1363	1587	
2579	SAN JUAN	M	N-RG	HIDALGO	0536	2497	3720	5149	6750	8482	10373	12314	
3774	SHARYLAND WSC	M	N-RG	HIDALGO	4333	4420	5036	5755	6561	7432	8384	9361	
2607	STEAM ELECTRIC POWER	M	N-RG	HIDALGO	1002	3487	10355	14151	16545	19462	23018	27354	
2584	SULLIVAN CITY	M	RG	HIDALGO	0966	403	557	737	939	1158	1396	1641	
2585	WESLACO	M	N-RG	HIDALGO	0638	4978	5707	6558	7512	8544	9671	10828	
2591	COUNTY-OTHER	M	N-RG	JIM HOGG	0757	132	140	150	158	164	162	156	
2592	COUNTY-OTHER	M	RG	JIM HOGG	0757	15	16	17	18	19	18	18	
2554	HEBBRONVILLE	M	N-RG	JIM HOGG	0268	705	747	799	840	873	864	831	
2626	IRRIGATION	M	N-RG	JIM HOGG	1004	817	794	766	744	744	744	744	
2637	LIVESTOCK	M	N-RG	JIM HOGG	1005	383	383	383	383	383	383	383	
2638	LIVESTOCK	M	RG	JIM HOGG	1005	135	135	135	135	135	135	135	
2612	MINING	M	N-RG	JIM HOGG	1003	27	33	36	37	38	39	40	
2593	COUNTY-OTHER	M	NUECES	MAVERICK	0757	4	5	7	8	9	10	10	
2594	COUNTY-OTHER	M	RG	MAVERICK	0757	2219	2834	3485	4100	4634	5122	5518	
2548	EAGLE PASS	M	RG	MAVERICK	0173	4720	5012	5321	5613	5866	6098	6286	
3760	EL INDIO WSC	M	RG	MAVERICK	4102	968	1293	1637	1962	2244	2502	2711	
2627	IRRIGATION	M	NUECES	MAVERICK	1004	4274	4213	4055	3874	3874	3874	3874	
2628	IRRIGATION	M	RG	MAVERICK	1004	99964	98542	94844	90612	90612	90612	90612	
2639	LIVESTOCK	M	NUECES	MAVERICK	1005	104	104	104	104	104	104	104	
2640	LIVESTOCK	M	RG	MAVERICK	1005	156	156	156	156	156	156	156	
2604	MANUFACTURING	M	RG	MAVERICK	1001	56	64	69	73	77	80	85	
2613	MINING	M	NUECES	MAVERICK	1003	97	108	112	115	117	119	121	
2614	MINING	M	RG	MAVERICK	1003	43	48	50	51	52	53	54	
2595	COUNTY-OTHER	M	N-RG	STARR	0757	189	249	312	378	444	509	571	
2596	COUNTY-OTHER	M	RG	STARR	0757	4677	6149	7723	9343	10976	12586	14130	
2629	IRRIGATION	M	RG	STARR	1004	10366	9605	9182	8777	8777	8777	8777	
2557	LA GRULLA	M	RG	STARR	0335	643	643	643	643	643	643	643	
2641	LIVESTOCK	M	N-RG	STARR	1005	246	246	246	246	246	246	246	
2642	LIVESTOCK	M	RG	STARR	1005	871	871	871	871	871	871	871	
2615	MINING	M	N-RG	STARR	1003	704	770	793	803	813	823	835	
2616	MINING	M	RG	STARR	1003	499	545	562	570	577	584	591	
2575	RIO GRANDE CITY	M	RG	STARR	0502	2404	2633	2879	3131	3386	3636	3877	
3773	RIO WSC	M	RG	STARR	4319	351	498	654	815	978	1138	1292	
2577	ROMA CITY	M	RG	STARR	0515	2413	2784	3181	3590	4002	4408	4797	
2597	COUNTY-OTHER	M	NUECES	WEBB	0757	120	140	162	188	216	246	278	
2598	COUNTY-OTHER	M	N-RG	WEBB	0757	180	209	243	281	323	368	417	
2599	COUNTY-OTHER	M	RG	WEBB	0757	926	1074	1249	1444	1659	1894	2142	
2551	EL CENIZO	M	RG	WEBB	0770	417	697	1027	1396	1801	2245	2713	
2630	IRRIGATION	M	RG	WEBB	1004	4137	3902	3678	3469	3469	3469	3469	
2561	LAREDO	M	RG	WEBB	0347	39558	52517	67741	84788	103541	124038	145690	
2643	LIVESTOCK	M	NUECES	WEBB	1005	666	666	666	666	666	666	666	
2644	LIVESTOCK	M	N-RG	WEBB	1005	91	91	91	91	91	91	91	
2645	LIVESTOCK	M	RG	WEBB	1005	756	756	756	756	756	756	756	
2605	MANUFACTURING	M	RG	WEBB	1001	23	28	31	34	37	39	42	
2617	MINING	M	NUECES	WEBB	1003	573	546	541	539	539	538	536	
2618	MINING	M	N-RG	WEBB	1003	439	419	415	414	413	412	410	
2619	MINING	M	RG	WEBB	1003	250	239	236	236	235	235	234	
3758	RIO BRAVO	M	RG	WEBB	1055	759	1137	1581	2078	2625	3222	3854	
2608	STEAM ELECTRIC POWER	M	RG	WEBB	1002	1795	1492	1190	1391	1636	1935	2300	
3777	WEBB COUNTY WATER UTILITY	M	RG	WEBB	4376	158	247	350	467	594	734	882	
2600	COUNTY-OTHER	M	N-RG	WILLACY	0757	216	216	216	216	216	216	215	
2631	IRRIGATION	M	N-RG	WILLACY	1004	27024	27322	27796	27993	27993	27993	27993	
2646	LIVESTOCK	M	N-RG	WILLACY	1005	151	151	151	151	151	151	151	
2563	LYFORD	M	N-RG	WILLACY	0373	290	307	324	339	352	360	365	
3831	MANUFACTURING	M	N-RG	WILLACY	1001	25	25	25	25	25	25	25	
2620	MINING	M	N-RG	WILLACY	1003	6	6	6	6	6	6	6	
3770	NORTH ALAMO WSC	M	N-RG	WILLACY	4273	613	773	930	1073	1188	1267	1306	
2574	RAYMONDVILLE	M	N-RG	WILLACY	0495	1668	1726	1783	1834	1876	1904	1918	
2580	SAN PERLITA	M	N-RG	WILLACY	0956	99	109	118	127	134	139	141	
3778	SEBASTIAN MUD	M	N-RG	WILLACY	4410	212	267	321	371	411	438	451	
2601	COUNTY-OTHER	M	RG	ZAPATA	0757	1001	1253	1553	1853	2136	2391	2580	
2632	IRRIGATION	M	RG	ZAPATA	1004	2265	2149	2036	1929	1929	1929	1929	
2647	LIVESTOCK	M	RG	ZAPATA	1005	474	474	474	474	474	474	474	
2621	MINING	M	RG	ZAPATA	1003	27	24	23	23	23	23	23	
2586	ZAPATA	M	RG	ZAPATA	0672	1050	1050	1050	1050	1050	1050	1050	

WATER SUPPLY AND DEMAND ANALYSIS

Municipal County Breakdown (ac-ft/yr)

WMS	Cameron County	Hidalgo	Jim Hogg	Maverick	Star	Webb	Willacy	Zapata	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)
Additional Groundwater	2,250	7,214	73	0	4,138	25,000	0	0	38,675	$ 11,774,990.50	$ 304.46
Advanced Water Conservation Measures	3,713	10,281	9	341	595	3,907	78	85	19,009	$ 2,137,995.43	$ 112.47
Non-Potable Water Re-use	500	18,991	0	0	0	11,200	0	0	30,691	$ 12,743,517.02	$ 415.22
Potable Water Re-use	0	1,120	0	0	0	0	0	0	1,120	$ 790,596.80	$ 705.89
Brownsville Weir and Reservoir	20,643	0	0	0	0	0	0	0	20,643	$ 11,090,864.61	$ 537.27
Acquisition of Water Rights:											
Purchase	15,435	58,906	8	2,227	11,443	33,300	88	1,813	123,220	$ 66,876,477.07	$ 542.74
Urbanization	0	15,468	0	0	0	0	0	0	15,468	$ 5,697,947.16	$ 368.37
Contract	847	2,256	0	0	187	1,337	5	0	4,632	$ 2,110,040.03	$ 455.56
Desalination:											
Brackish Groundwater Desalination	14,121	21,592	0	641	0	22,400	11,426	0	70,180	$ 35,476,691.80	$ 505.51
Seawater Desalination	889	0	0	0	0	0	0	0	889	$ 682,423.07	$ 767.63
Totals:	**58398.34865**	**135827.924**	**90.293001**	**3208.749**	**16363**	**97144**	**11596.9**	**1898.4**	**324,527**	**$ 149,381,543.50**	**$ 4,715.12**

WATER SUPPLY AND DEMAND ANALYSIS							
County-Other: Zapata County							
Year			**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population		7,326	9,169	11,361	13,559	15,630	17,498	18,877
Total Water Demand			1,232	1,514	1,792	2,048	2,293	2,474
Advanced Water Conservation WMS (ac-ft)			14	30	46	61	75	85
Net Water Demand (ac-ft)			**1,218**	**1,484**	**1,746**	**1,987**	**2,218**	**2,389**
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		661	661	661	661	661	661
OTHER AQUIFER	Ground Water		0	0	0	0	0	0
Total Supply (AF/yr)			**661**	**661**	**661**	**661**	**661**	**661**
Projected Supply Surplus/Deficit			**-571**	**-853**	**-1,131**	**-1,387**	**-1,632**	**-1,813**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	85	$ 9,604.55	$ 112.47		14	30	46	61	75	85
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,813	$ 983,987.62	$ 542.74		571	853	1,131	1,387	1,632	1,813
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

585	883	1,177	1,448	1,707	1,898
14	30	46	61	75	85

WATER SUPPLY AND DEMAND ANALYSIS							
County-Other: Willacy County							
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	385	385	385	385	385	385	384
Total Water Demand		215	213	212	211	210	209

Current Water Supply	**Type**						
AMISTAD/FALCON	Surface Water	698	579	471	370	267	267
Total Supply (AF/yr)		**698**	**579**	**471**	**370**	**267**	**267**
Projected Supply Surplus/Deficit		**483**	**366**	**259**	**159**	**57**	**58**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

0	0	0	0	0	0
483	366	259	159	57	58

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Webb County

Year			2010	2020	2030	2040	2050	2060
Total Population		6,592	7,651	8,895	10,287	11,817	13,491	15,259
Total Water Demand			1,388	1,575	1,786	2,025	2,296	2,599

Current Water Supply	Type						
AMISTAD/FALCON	Surface Water	0	0	0	0	0	0
AMISTAD/FALCON	Surface Water	0	0	0	0	0	0
AMISTAD/FALCON	Surface Water	1	1	1	1	1	1
CARRIZO-WILCOX	Ground Water	77	77	77	77	77	77
CARRIZO-WILCOX	Ground Water	115	115	115	116	116	116
CARRIZO-WILCOX	Ground Water	593	593	594	595	595	596
GULF COAST	Ground Water	27	27	27	27	27	27
GULF COAST	Ground Water	40	40	40	40	40	40
GULF COAST	Ground Water	207	207	207	207	207	208
OTHER AQUIFER	Ground Water	13	13	13	13	13	13
OTHER AQUIFER	Ground Water	19	19	19	19	19	19
OTHER AQUIFER	Ground Water	99	99	99	99	99	99
Total Supply (AF/yr)		**1,191**	**1,192**	**1,193**	**1,194**	**1,195**	**1,196**
Projected Supply Surplus/Deficit		**-197**	**-383**	**-593**	**-831**	**-1,101**	**-1,403**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	529	$ 161,059.34	$ 304.46		74	144	224	313	416	529
Advanced Water Conservation Measures	64	$ 7,206.53	$ 112.47		8	17	27	39	51	64
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	874	$ 474,354.76	$ 542.74		123	240	370	518	686	874
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

205	401	621	870	1,153	1,467
8	18	28	39	52	64

WATER SUPPLY AND DEMAND ANALYSIS							
County-Other: Starr County							
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	28,770	37,826	47,504	57,471	67,517	77,418	86,919
Total Water Demand		6,228	7,663	9,141	10,663	12,141	13,631

Current Water Supply	**Type**						
AMISTAD/FALCON	Surface Water	30	30	30	30	30	30
AMISTAD/FALCON	Surface Water	751	751	751	751	751	751
OTHER AQUIFER	Ground Water	3	3	3	3	3	3
OTHER AQUIFER	Ground Water	74	74	74	74	74	74
GULF COAST	Ground Water	748	748	748	748	748	748
Total Supply (AF/yr)		**1,607**	**1,607**	**1,607**	**1,607**	**1,607**	**1,607**
Projected Supply Surplus/Deficit		**-4,621**	**-6,056**	**-7,534**	**-9,056**	**-10,534**	**-12,024**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	4,138	$ 1,259,855.48	$ 304.46		1,580	3270	2981	3712	4022	4138
Advanced Water Conservation Measures	430	$ 48,350.35	$ 112.47		67	139	212	286	360	430
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	7,886	$ 4,280,047.64	$ 542.74		3,041	2786	4,553	5334	6,512	7886
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

4,688	6,195	7,746	9,332	10,894	12,454
67	138	212	276	359	430

WATER SUPPLY AND DEMAND ANALYSIS								
County-Other: Maverick County								
Year			**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population		19,649	25,098	30,862	36,312	41,036	45,358	48,864
Total Water Demand			2,727	3,249	3,742	4,183	4,573	4,926
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		2,174	2,174	2,174	2,174	2,174	2,174
CARRIZO-WILCOX	Ground Water		1	1	1	1	1	1
CARRIZO-WILCOX	Ground Water		267	267	267	267	267	267
OTHER AQUIFER	Ground Water		1	1	1	1	1	1
OTHER AQUIFER	Ground Water		257	257	257	257	257	257
Total Supply (AF/yr)			**2,700**	**2,700**	**2,700**	**2,700**	**2,700**	**2,700**
Projected Supply Surplus/Deficit			**-27**	**-549**	**-1,042**	**-1,483**	**-1,873**	**-2,226**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	216	$ 24,292.00	$ 112.47		40	83	123	158	190	216
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	2,226	$ 1,208,139.24	$ 542.74		27	549	1042	1483	1,873	2226
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

67	632	1,165	1,641	2,063	2,442
40	83	123	158	190	216

WATER SUPPLY AND DEMAND ANALYSIS							
County-Other: Jim Hogg County							
Year			**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population		783	829	887	932	969	959	923
Total Water Demand			153	159	164	167	165	158
Current Water Supply	**Type**							
GULF COAST	Ground Water		77	77	77	77	77	77
GULF COAST	Ground Water		9	9	9	9	9	9
Total Supply (AF/yr)			**86**	**86**	**86**	**86**	**86**	**86**
Projected Supply Surplus/Deficit			**-67**	**-73**	**-78**	**-81**	**-79**	**-72**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	73	$ 22,225.58	$ 304.46		60	66	70	73	71	65
Advanced Water Conservation Measures	1	$ 154.66	$ 112.47		0	1	1	1	1	1
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	8	$ 4,341.92	$ 542.74		7	7	8	8	8	7
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

67	74	79	82	80	73
0	1	1	1	1	1

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Hidalgo County

Year			2010	2020	2030	2040	2050	2060
Total Population		60,808	80,235	109,064	141,351	176,285	214,445	253,592
Total Water Demand			9,886	13,072	16,626	20,536	24,981	29,542

Current Water Supply	Type	2010	2020	2030	2040	2050	2060
AMISTAD/FALCON	Surface Water	8,827	8,714	8,612	8,515	8,418	8,327
AMISTAD/FALCON	Surface Water	465	459	453	448	443	438
GULF COAST	Ground Water	1,589	1,447	1,299	1,131	939	743
GULF COAST	Ground Water	93	86	78	68	57	45
Total Supply (AF/yr)		**10,974**	**10,706**	**10,442**	**10,163**	**9,857**	**9,553**
Projected Supply Surplus/Deficit		**1,088**	**-2,366**	**-6,184**	**-10,373**	**-15,124**	**-19,989**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	4,389	$ 1,336,274.94	$ 304.46		0	1089	1887	3861	4098	4389
Advanced Water Conservation Measures	1,425	$ 160,298.11	$ 112.47		144	357	595	854	1,136	1,425
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	15,600	$ 8,466,744.00	$ 542.74		0	1277	4297	6512	11,026	15600
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

144	2,723	6,779	11,227	16,260	21,414
1,231	356	595	854	1,136	1,425

WATER SUPPLY AND DEMAND ANALYSIS								
County-Other: Cameron County								
Year			**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population		38,872	45,090	51,663	58,457	65,231	72,006	78,449
Total Water Demand			6,970	7,812	8,709	9,572	10,485	11,424
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		13,090	13,078	13,068	13,059	13,052	13,047
OTHER LOCAL SUPPLY*	Surface Water		0	0	0	0	0	0
GULF COAST	Ground Water		2,519	2,478	2,439	2,396	2,354	2,311
GULF COAST	Ground Water		5	5	4	4	4	4
Total Supply (AF/yr)			**15,614**	**15,561**	**15,511**	**15,459**	**15,410**	**15,362**
Projected Supply Surplus/Deficit			**8,644**	**7,749**	**6,802**	**5,887**	**4,925**	**3,938**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	293	$ 32,907.91	$ 112.47		46	95	145	195	245	293
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Although there are water rights located on water courses in this basin other than the Rio Grande, these water rights are based to a large extent on irrigation return flows with poor water quality, therefore, the available supply has been set to zero.

46	95	145	195	245	293
8,690	7,844	6,946	6,082	5,170	4,230

WATER SUPPLY AND DEMAND ANALYSIS

CITY OF BROWNSVILLE

Year					2010	2020	2030	2040	2050	2060
Total Population				139722	173,986	210,210	247,653	284,979	322,316	357,828
Total Water Demand (ac-ft)					44,630	53,921	63,526	73,101	82,679	91,788
Advanced Water Conservation WMS (ac-ft)					974	1,884	3,051	3,831	4,694	5,211
Net Water Demand (ac-ft)					**43,656**	**52,037**	**60,475**	**69,270**	**77,985**	**86,577**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	865	29,285	MUNI		29,285	29,285	29,285	29,285	29,285	29,285
Groundwater-SRWA		7,800	GW		7,800	7,800	7,800	7,800	7,800	7,800
Total Supply (AF/yr)		**37,085**			**37,085**	**37,085**	**37,085**	**37,085**	**37,085**	**37,085**
Projected Supply Surplus/Deficit					**-6,570**	**-14,952**	**-23,389**	**-32,185**	**-40,900**	**-49,492**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	1,000	$ 304,460.00	$ 304.46		0	1000	1000	1000	1000	1000
Advanced Water Conservation Measures	1,612	$ 181,353.11	$ 112.47		253	521	798	1,074	1,350	1,612
Non-Potable Water Re-use	500	$ 207,610.00	$ 415.22		0	500	500	500	500	500
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	20,643	$ 11,090,864.61	$ 537.27		20,643	20,643	20,643	20,643	20,643	20,643
Acquisition of Water Rights:										
Purchase	1,793	$ 973,132.82	$ 542.74		0	0	0	0	0	1793
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	129	$ 58,767.24	$ 455.56		0	0	0	0	0	129
Desalination:										
Brackish Groundwater Desalination	6,070	$ 3,068,445.70	$ 505.51		6,070	6,070	6,070	6,070	6,070	6,070
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0
					26,966	28,734	29,011	29,287	29,563	31,747
					20,396	13,782	5,622	-2,898	-11,337	-17,745

WATER SUPPLY AND DEMAND ANALYSIS

COMBES

Year					2010	2020	2030	2040	2050	2060
Total Population				2553	3,089	3,655	4,240	4,823	5,407	5,962
Total Water Demand					225	266	309	351	394	434
Advanced Water Conservation WMS (ac-ft)					17	37	52	70	85	94
Net Water Demand (ac-ft)					**208**	**229**	**257**	**281**	**309**	**341**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	831	429.6	MUNI		430	430	430	430	430	430
Groundwater			GW							
Total Supply (AF/yr)		**429.6**			**430**	**430**	**430**	**430**	**430**	**430**
Projected Supply Surplus/Deficit					**222**	**200**	**173**	**149**	**120**	**89**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	25	$ 2,834.55	$ 112.47		4	8	12	17	21	25
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	25	$ 12,637.75	$ 505.51		0	25	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of Harlingen

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	226	234	210	191	166	139

WATER SUPPLY AND DEMAND ANALYSIS

E. RIO HONDO WSC

Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	13741	13,741	19,904	26,420	33,155	39,869	46,585
Total Water Demand		2,519	3,344	4,197	5,046	5,897	6,705
Advanced Water Conservation WMS (ac-ft)		111	237	334	491	574	653
Net Water Demand (ac-ft)		**2,408**	**3,107**	**3,863**	**4,555**	**5,323**	**6,052**

Current Water Supply	**Water Right Number**	**Amount**	**Type**						
Amistad-Falcon Water Right/Contracts*	73, 284, 296, 838, 841, 625, 3269, 692	5,046	MUNI	5,046	5,046	5,046	5,046	5,046	5,046
Groundwater		0	GW						
Total Supply (AF/yr)		**5,046**		**5,046**	**5,046**	**5,046**	**5,046**	**5,046**	**5,046**
Projected Supply Surplus/Deficit				**2,639**	**1,939**	**1,184**	**492**	**-277**	**-1,006**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	243	$ 27,309.48	$ 112.47		0	46	94	144	193	243
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	95	$ 51,560.30	$ 542.74		0	0	0	0	95	95
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	5	$ 2,277.80	$ 455.56		0	0	0	0	5	5
Desalination:										
Brackish Groundwater Desalination	906	$ 457,992.06	$ 505.51		100	100	100	100	177	906
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	2,739	2,085	1,377	735	194	243

WATER SUPPLY AND DEMAND ANALYSIS										
EL JARDIN										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				8341	10,859	13,521	16,274	19,017	21,761	24,371
Total Water Demand					1,970	2,454	2,953	3,450	3,949	4,423
Advanced Water Conservation WMS (ac-ft)					61	121	182	234	293	328
Net Water Demand (ac-ft)					**1,909**	**2,333**	**2,771**	**3,216**	**3,656**	**4,095**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	843	1,600	MUNI							
Groundwater		0	GW							
Total Supply (AF/yr)		**1,600**			**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**
Projected Supply Surplus/Deficit					**-309**	**-733**	**-1,171**	**-1,616**	**-2,056**	**-2,495**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	119	$ 13,328.80	$ 112.47		19	38	59	79	99	119
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	2,370	$ 1,286,429.49	$ 542.74		294	696	1,112	1,535	1,953	2,370
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	125	$ 56,831.11	$ 455.56		15	37	59	81	103	125
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Brownsville Irrigation District

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	18	38	59	79	99	118

WATER SUPPLY AND DEMAND ANALYSIS

HARLINGEN

Year					2010	2020	2030	2040	2050	2060
Total Population				57564	66,805	76,575	86,674	96,741	106,811	116,389
Total Water Demand					11,674	13,381	15,146	16,905	18,664	20,338
Advanced Water Conservation WMS (ac-ft)					299	600	971	1,300	1,555	1,695
Net Water Demand (ac-ft)					**11,375**	**12,781**	**14,175**	**15,605**	**17,109**	**18,643**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	223, 831, 840, 5254	16,621.0	MUNI		16,621	16,621	16,621	16,621	16,621	16,621
Groundwater		0.0	GW							
Total Supply (AF/yr)		**16,621.0**			16,621	16,621	16,621	16,621	16,621	16,621
Projected Supply Surplus/Deficit					**5,246**	**3,840**	**2,446**	**1,016**	**-488**	**-2,022**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	435	$ 48,912.44	$ 112.47		68	141	215	290	364	435
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	2,022	$ 1,022,141.22	$ 505.51		0	25	25	25	488	2022
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Future Development of Desal. Plant or Wholesale Purchase

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	5,315	4,006	2,686	1,331	364	435

WATER SUPPLY AND DEMAND ANALYSIS

INDIAN LAKE

Year					2010	2020	2030	2040	2050	2060
Total Population				541	699	866	1,039	1,211	1,383	1,547
Total Water Demand					52	64	77	90	102	114
Advanced Water Conservation WMS (ac-ft)					3	7	10	14	17	19
Net Water Demand (ac-ft)					**49**	**57**	**67**	**76**	**85**	**95**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	various WRs	30.7	MUNI							
Groundwater										
Total Supply (AF/yr)		**30.7**			**31**	**31**	**31**	**31**	**31**	**31**
Projected Supply Surplus/Deficit					**-18**	**-27**	**-36**	**-46**	**-54**	**-64**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	7	$ 836.48	$ 112.47		1	2	4	5	6	7
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	64	$ 32,352.64	$ 505.51		18	27	36	46	54	64
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*supplied by ERHWSC

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1	3	4	5	6	7

WATER SUPPLY AND DEMAND ANALYSIS										
LA FERIA										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				6115	7,954	9,898	11,908	13,912	15,916	17,822
Total Water Demand					909	1,131	1,361	1,590	1,818	2,036
Advanced Water Conservation WMS (ac-ft)					53	100	147	187	232	260
Net Water Demand (ac-ft)					**856**	**1,031**	**1,214**	**1,403**	**1,586**	**1,776**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	803	1,800.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**1,800.0**			**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**
Projected Supply Surplus/Deficit					**944**	**769**	**586**	**397**	**214**	**24**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	87	$ 9,734.26	$ 112.47		14	28	43	58	72	87
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	280	$ 141,542.80	$ 505.51		0	280	280	280	280	280
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* supplied by La Feria ID Cameron Cty No. 3

*Informed NRS through survey that they are looking into Brackish Desal. as a water supply

Surplus/Deficit after WMS's	958	1,077	909	735	566	390

WATER SUPPLY AND DEMAND ANALYSIS										
LAGUNA MADRE										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				4242	7,725	11,408	15,215	19,010	22,806	26,416
Total Water Demand					2,345	3,463	4,619	5,771	6,923	8,019
Advanced Water Conservation WMS (ac-ft)					35	77	102	149	179	207
Net Water Demand (ac-ft)					**2,310**	**3,386**	**4,517**	**5,622**	**6,744**	**7,812**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	850, 5127	7,480.4	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)*		7,480.4								
Contracts to Laguna Vista, South Padre, and Port Isabel**		3532								
Total Supply minus contracts		**3948**			**3,948**	**3,948**	**3,948**	**3,948**	**3,948**	**3,948**
Projected Supply Surplus/Deficit					**1,638**	**562**	**-568**	**-1,674**	**-2,796**	**-3,864**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	164	$ 18,437.48	$ 112.47		26	53	81	109	137	164
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	950	$ 515,603.00	$ 542.74		0	0	48	238	475	950
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	50	$ 22,778.00	$ 455.56		0	0	2	12	25	50
Desalination:										
Brackish Groundwater Desalination	2,000	$ 1,011,020.00	$ 505.51		100	100	400	1000	1500	2,000
Seawater Desalination	864	$ 663,232.32	$ 767.63		100	100	118	424	796	864

***Projected supply for 2010-2060 excludes amounts supplied to Laguna Vista, Port Isabel, and South Padre**
****Based on amounts supplied in 2003**

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,864	815	81	110	137	164

WATER SUPPLY AND DEMAND ANALYSIS										
LAGUNA VISTA										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				1658	2,174	2,719	3,282	3,844	4,406	4,940
Total Water Demand					280	350	423	495	568	636
Advanced Water Conservation WMS (ac-ft)					12	27	40	52	64	72
Net Water Demand (ac-ft)					**268**	**323**	**383**	**443**	**504**	**564**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	850, 5127	1,022.0	MUNI							
Groundwater		0.0	GW							
		0.0								
Total Supply (AF/yr)**		**1,022.0**			**1,022**	**1,022**	**1,022**	**1,022**	**1,022**	**1,022**
Projected Supply Surplus/Deficit					**754**	**699**	**639**	**579**	**518**	**458**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	24	$ 2,728.95	$ 112.47		4	8	12	16	20	24
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	25	$ 19,190.75	$ 767.63		25	25	25	25	25	25

* Supplied by Laguna Madre WD water rights
** Supply based on amount of water supplied in 2003

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	783	732	676	620	563	507

WATER SUPPLY AND DEMAND ANALYSIS

LOS FRESNOS

Year		2010	2020	2030	2040	2050	2060
Total Population	4512	6,649	8,908	11,243	13,571	15,899	18,114
Total Water Demand		797	1,068	1,348	1,627	1,906	2,171
Advanced Water Conservation WMS (ac-ft)		12	27	40	52	64	72
Net Water Demand (ac-ft)		**785**	**1,041**	**1,308**	**1,575**	**1,842**	**2,099**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	853	911.7	MUNI						
Groundwater		190.0	GW						
Total Supply (AF/yr)		**1,101.7**		**1,102**	**1,102**	**1,102**	**1,102**	**1,102**	**1,102**
Projected Supply Surplus/Deficit				**317**	**61**	**-206**	**-474**	**-740**	**-997**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	101	$ 11,309.94	$ 112.47		16	32	50	67	84	101
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	997	$ 503,993.47	$ 505.51		0	0	206	474	740	997
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	333	94	50	67	84	100

WATER SUPPLY AND DEMAND ANALYSIS

LOS INDIOS

Year		2010	2020	2030	2040	2050	2060
Total Population	1149	1,418	1,703	1,997	2,290	2,583	2,862
Total Water Demand		238	286	336	385	434	481
Advanced Water Conservation WMS (ac-ft)		8	15	25	31	38	42
Net Water Demand (ac-ft)		**230**	**271**	**311**	**354**	**396**	**439**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*		0.0	MUNI						
Groundwater		230.0	GW						
Total Supply (AF/yr)**		**230.0**		**230**	**271**	**311**	**354**	**396**	**439**
Projected Supply Surplus/Deficit				**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	13	$ 1,424.34	$ 112.47		2	4	6	8	11	13
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by MHWSC
**Projected supply based on MHWSC meeting demand through 2060

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	2	4	6	8	10	12

WATER SUPPLY AND DEMAND ANALYSIS

MILITARY HIGHWAY WSC

Year					2010	2020	2030	2040	2050	2060
Total Population				8961	11,440	14,061	16,770	19,471	22,173	24,742
Total Water Demand					1,551	1,906	2,273	2,639	3,005	3,353
Advanced Water Conservation WMS (ac-ft)					64	126	207	262	323	360
Net Water Demand (ac-ft)					**1,487**	**1,780**	**2,066**	**2,377**	**2,682**	**2,993**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	284, 285, 286, 831	2,792.6	MUNI		1,396	1,396	1,396	1,396	1,396	1,396
Groundwater		2,891.0	GW		1,163	1,122	1,044	935	799	655
Supplied to Los Indios					230	271	311	354	396	439
Supplied to Progresso					576	717	867	1,037	1,234	1,436
Total Supply (AF/yr)		5,683.6								
Total Supply (AF/yr) less contracts*					**1,753**	**1,530**	**1,262**	**940**	**565**	**176**
Projected SupplySurplus/Deficit					**266**	**-250**	**-804**	**-1,437**	**-2,117**	**-2,817**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	1,250	$ 380,575.00	$ 304.46		0	250	500	750	1000	1250
Advanced Water Conservation Measures	117	$ 13,121.75	$ 112.47		18	38	58	78	98	117
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,489	$ 808,139.86	$ 542.74		0	0	289	653	1,061	1,489
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	78	$ 35,533.68	$ 455.56		0	0	15	34	56	78
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Available to meet customers other than Los Indios and Progresso

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	285	37	58	77	98	117

WATER SUPPLY AND DEMAND ANALYSIS

OLMITO WSC

Year		2010	2020	2030	2040	2050	2060
Total Population	4479	7,261	10,203	13,244	16,275	19,307	22,191
Total Water Demand		992	1,394	1,810	2,224	2,638	3,033
Advanced Water Conservation WMS (ac-ft)		41	80	119	164	195	224
Net Water Demand (ac-ft)		**951**	**1,314**	**1,691**	**2,060**	**2,443**	**2,809**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	854	995.7	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**995.7**		**996**	**995**	**996**	**996**	**996**	**996**
Projected Supply Surplus/Deficit				**44**	**-319**	**-696**	**-1,064**	**-1,448**	**-1,814**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	131	$ 14,727.36	$ 112.47		21	42	65	87	110	131
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,723	$ 935,303.84	$ 542.74		0	303	661	1,011	1,376	1,723
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	91	$ 41,319.29	$ 455.56		0	16	35	53	72	91
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	65	42	65	87	110	131

WATER SUPPLY AND DEMAND ANALYSIS

PALM VALLEY

Year					2010	2020	2030	2040	2050	2060
Total Population				1298	1,402	1,512	1,625	1,738	1,851	1,959
Total Water Demand					421	454	488	522	556	588
Advanced Water Conservation WMS (ac-ft)					8	14	20	27	31	33
Net Water Demand (ac-ft)					**413**	**440**	**468**	**495**	**525**	**555**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	809		MUNI							
Groundwater			GW							
Total Supply (AF/yr)					**331**	**319**	**309**	**300**	**293**	**288**
Projected Supply Surplus/Deficit					**-82**	**-122**	**-159**	**-195**	**-232**	**-268**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	5	$ 549.62	$ 112.47		1	2	2	3	4	5
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	255	$ 138,181.60	$ 542.74		78	116	151	185	220	255
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	13	$ 6,104.50	$ 455.56		4	6	8	10	12	13
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Palm Valley UD and Harlingen ID water right

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1	2	2	4	4	5

WATER SUPPLY AND DEMAND ANALYSIS										
PALM VALLEY ESTATES UD										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				250	344	444	547	650	753	851
Total Water Demand					86	111	137	163	189	214
Advanced Water Conservation WMS (ac-ft)					2	3	6	8	9	10
Net Water Demand (ac-ft)					**84**	**108**	**131**	**155**	**180**	**204**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	831	100.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**100.0**			**81**	**94**	**104**	**112**	**119**	**125**
Projected Supply Surplus/Deficit					**-3**	**-14**	**-28**	**-43**	**-60**	**-79**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	4	$ 499.73	$ 112.47		1	1	2	3	4	4
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	75	$ 40,705.50	$ 542.74		3	12	27	41	57	75
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	4	$ 1,822.24	$ 455.56		0	2	1	2	3	4
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied by Harlingen ID water right

Surplus/Deficit after WMS's	1	2	3	3	3	5

WATER SUPPLY AND DEMAND ANALYSIS										
PORT ISABEL										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				4865	5,282	5,723	6,179	6,633	7,088	7,520
Total Water Demand					2,668	2,891	3,122	3,351	3,581	3,799
Advanced Water Conservation WMS (ac-ft)					24	45	69	97	111	118
Net Water Demand (ac-ft)					**2,644**	**2,846**	**3,053**	**3,254**	**3,470**	**3,681**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	850	756.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)**		**756.0**			**756**	**756**	**756**	**756**	**756**	**756**
Projected Supply Surplus/Deficit					**-1,888**	**-2,090**	**-2,297**	**-2,498**	**-2,714**	**-2,925**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	20	$ 2,207.61	$ 112.47		3	6	10	13	16	20
Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,389	$ 753,811.59	$ 542.74		897	993	1,091	1,187	1,289	1,389
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	73	$ 33,301.44	$ 455.56		47	52	57	62	68	73
Desalination:										
Brackish Groundwater Desalination	1,463	$ 739,561.13	$ 505.51		944	1045	1149	1249	1357	1463
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied by Laguna Madre WD water rights
** Supply based on amount of water supplied in 2003

Surplus/Deficit after WMS's	3	6	10	13	17	20

WATER SUPPLY AND DEMAND ANALYSIS										
PRIMERA										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				2723	3,449	4,217	5,011	5,802	6,593	7,346
Total Water Demand					549	671	797	923	1,049	1,168
Advanced Water Conservation WMS (ac-ft)					23	43	67	84	103	115
Net Water Demand (ac-ft)					**526**	**628**	**730**	**839**	**946**	**1,053**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	855, 831	584.0	MUNI		584	584	584	584	584	584
Groundwater		0.0	GW							
Total Supply (AF/yr)		**584.0**			**584**	**584**	**584**	**584**	**584**	**584**
Projected Supply Surplus/Deficit					**58**	**-44**	**-146**	**-255**	**-362**	**-469**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	34	$ 3,843.98	$ 112.47		5	11	17	23	29	34
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	422	$ 228,927.73	$ 542.74		0	18	115	219	320	422
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	22	$ 10,113.43	$ 455.56		0	1	6	12	17	22
Desalination:										
Brackish Groundwater Desalination	25	$ 12,637.75	$ 505.51		0	25	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of Primera water right, and Harlingen ID contract

Surplus/Deficit after WMS's 64 11 17 23 29 34

WATER SUPPLY AND DEMAND ANALYSIS

RANCHO VIEJO

Year					2010	2020	2030	2040	2050	2060
Total Population				1754	2,665	3,628	4,623	5,615	6,607	7,551
Total Water Demand					385	524	668	811	955	1,091
Advanced Water Conservation WMS (ac-ft)					12	28	41	57	67	76
Net Water Demand (ac-ft)					**373**	**496**	**627**	**754**	**888**	**1,015**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	202	See Valley MUD #2	MUNI		827	827	827	827	827	827
Groundwater: SRWA + VMUD2 Contracts			GW		355	355	355	355	355	355
Total Supply (AF/yr)					**1,182**	**1,182**	**1,182**	**1,182**	**1,182**	**1,182**
Projected Supply Surplus/Deficit**					**809**	**686**	**555**	**427**	**293**	**167**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	43	$ 4,820.15	$ 112.47		7	14	21	29	36	43
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied Valley MUD #2 water right

**Surplus/Deficit based on Valley MUD supplying demand through 2060

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	815	700	576	456	329	210

WATER SUPPLY AND DEMAND ANALYSIS

RIO HONDO

Year					2010	2020	2030	2040	2050	2060
Total Population				1942	2,098	2,263	2,434	2,604	2,774	2,936
Total Water Demand					416	449	483	516	550	582
Advanced Water Conservation WMS (ac-ft)					12	20	30	41	47	49
Net Water Demand (ac-ft)					**404**	**429**	**453**	**475**	**503**	**533**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	841	890.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**890.0**			**890**	**890**	**890**	**890**	**890**	**890**
Projected Supply Surplus/Deficit					**486**	**461**	**437**	**415**	**387**	**357**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	7	$ 826.50	$ 112.47		1	2	4	5	6	7
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	487	464	441	420	393	365

WATER SUPPLY AND DEMAND ANALYSIS										
SAN BENITO										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				23444	26,922	30,599	34,400	38,189	41,979	45,584
Total Water Demand					5,036	5,724	6,435	7,144	7,853	8,527
Advanced Water Conservation WMS (ac-ft)					121	240	385	513	611	664
Net Water Demand (ac-ft)					**4,915**	**5,484**	**6,050**	**6,631**	**7,242**	**7,863**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	841	7,032.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**7,032.0**			**7,032**	**7,032**	**7,032**	**7,032**	**7,032**	**7,032**
Projected Supply Surplus/Deficit					**2,117**	**1,548**	**982**	**401**	**-210**	**-831**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	164	$ 18,409.20	$ 112.47		26	53	81	109	137	164
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	789	$ 428,466.09	$ 542.74		0	0	0	0	199.5	789.45
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	42	$ 18,928.52	$ 455.56		0	0	0	0	10.5	41.55
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Cameron County ID #2

Surplus/Deficit after WMS's	2,142	1,601	1,063	510	137	163

WATER SUPPLY AND DEMAND ANALYSIS

SANTA ROSA

Year					2010	2020	2030	2040	2050	2060
Total Population				2833	3,472	4,148	4,847	5,543	6,240	6,903
Total Water Demand					350	418	489	559	629	696
Advanced Water Conservation WMS (ac-ft)					19	42	60	81	98	108
Net Water Demand (ac-ft)					**331**	**376**	**429**	**478**	**531**	**588**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	803	900.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**900.0**			**900**	**900**	**900**	**900**	**900**	**900**
Projected Supply Surplus/Deficit					**569**	**524**	**471**	**422**	**369**	**312**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	30	$ 3,384.17	$ 112.47		5	10	15	20	25	30
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied through LaFeria, Cameron County ID #2

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	574	534	486	442	394	342

WATER SUPPLY AND DEMAND ANALYSIS										
SOUTH PADRE ISLAND										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				2422	3,203	4,028	4,881	5,732	6,583	7,392
Total Water Demand					2,526	3,176	3,849	4,520	5,191	5,829
Advanced Water Conservation WMS (ac-ft)					22	41	60	77	96	108
Net Water Demand (ac-ft)					**2,504**	**3,135**	**3,789**	**4,443**	**5,095**	**5,721**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	850	1,754.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**1,754.0**			**1,754**	**1,754**	**1,754**	**1,754**	**1,754**	**1,754**
Projected Supply Surplus/Deficit					**-750**	**-1,381**	**-2,035**	**-2,689**	**-3,341**	**-3,967**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	37	$ 4,132.51	$ 112.47		6	12	18	24	31	37
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	3,769	$ 2,045,397.10	$ 542.74		713	1,312	1,933	2,555	3,174	3,769
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	198	$ 90,360.33	$ 455.56		38	69	102	134	167	198
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied by Laguna Madre WD water rights
** Supply based on amount of water supplied in 2003

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	5	11	18	25	31	36

WATER SUPPLY AND DEMAND ANALYSIS

VALLEY MUD #2

Year					2010	2020	2030	2040	2050	2060
Total Population				1246	1,246	1,246	1,246	1,246	1,246	1,246
Total Water Demand					863	863	863	863	863	863
Advanced Water Conservation WMS (ac-ft)					4	8	13	17	20	20
Net Water Demand (ac-ft)					**859**	**855**	**850**	**846**	**843**	**843**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	own WR		MUNI		656	162	150	138	125	113
Groundwater: SRWA + VMUD2			GW		353	310	264	219	173	128
Total Supply (AF/yr)					**1,009**	**472**	**414**	**357**	**298**	**242**
Projected Supply Surplus/Deficit					**150**	**-383**	**-437**	**-489**	**-546**	**-602**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	316	$ 171,695.80	$ 542.74		0	113	160	209	263	316
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	17	$ 7,585.07	$ 455.56		0	6	8	11	14	17
Desalination:										
Brackish Groundwater Desalination	269	$ 135,982.19	$ 505.51		0	268	269	269	269	269
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	150	4	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

ALAMO

Year		2010	2020	2030	2040	2050	2060
Total Population	14760	20,915	28,107	36,163	44,880	54,400	64,166
Total Water Demand		2,413	3,243	4,172	5,178	6,276	7,403
Advanced Water Conservation WMS (ac-ft)		94	220	365	503	609	719
Net Water Demand (ac-ft)		**2,319**	**3,023**	**3,807**	**4,675**	**5,667**	**6,684**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	808	1,804.3	MUNI	1,804	1,804	1,804	1,804	1,804	1,804
Groundwater		450.0	GW	450	450	450	450	450	450
Total Supply (AF/yr)		**2,254.3**		**2,254**	**2,254**	**2,254**	**2,254**	**2,254**	**2,254**
Projected Supply Surplus/Deficit				**-65**	**-768**	**-1,553**	**-2,421**	**-3,412**	**-4,430**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	100	$ 30,446.00	$ 304.46		0	100	100	100	100	100
Advanced Water Conservation Measures	365	$ 41,080.63	$ 112.47		46	99	158	223	293	365
Non-Potable Water Re-use	500	$ 207,610.00	$ 415.22		25	100	200	300	400	500
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	451	$ 244,775.74	$ 542.74		13	90	180	271	361	451
Urbanization	2,100	$ 773,577.00	$ 368.37		25	400	800	1,300	1,700	2,100
Contract		$ -	$ 455.56		2	5	10	14	19	24
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	1,255	$ 634,415.05	$ 505.51		0	73	263	436	832	1255
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Hidalgo County ID #2
*Current Policy of HCID#2 is to transfer water rights when land is excluded from the district at no charge.

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	46	98	158	223	293	365

WATER SUPPLY AND DEMAND ANALYSIS										
ALTON										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				4384	12,342	15,513	19,064	22,907	27,104	31,411
Total Water Demand					3,401	4,275	5,253	6,312	7,469	8,655
Advanced Water Conservation WMS (ac-ft)					55	122	192	257	334	387
Net Water Demand (ac-ft)					**55**	**122**	**192**	**257**	**334**	**387**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	809	3,346.0	MUNI		3,346	4,153	2,615	2,637	2,653	2,666
Groundwater		0.0	GW							
Total Supply (AF/yr)		**3,346.0**			**3,346**	**4,153**	**2,615**	**2,637**	**2,653**	**2,666**
Projected Supply Surplus/Deficit					**3,291**	**4,031**	**2,423**	**2,380**	**2,319**	**2,279**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	200	$ 22,472.70	$ 112.47		59	82	109	137	168	200
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Sharyland WSC

Surplus/Deficit after WMS's	3,350	4,114	2,532	2,517	2,487	2,479

WATER SUPPLY AND DEMAND ANALYSIS

DONNA

Year		2010	2020	2030	2040	2050	2060
Total Population	14768	16,757	19,080	21,682	24,498	27,574	30,729
Total Water Demand		2,384	2,714	3,084	3,485	3,923	4,371
Advanced Water Conservation WMS (ac-ft)		75	150	243	329	402	447
Net Water Demand (ac-ft)		**2,309**	**2,564**	**2,841**	**3,156**	**3,521**	**3,924**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	805	4,190.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**4,190.0**		**4,190**	**4,190**	**4,190**	**4,190**	**4,190**	**4,190**
Projected Supply Surplus/Deficit				**1,881**	**1,626**	**1,349**	**1,034**	**669**	**266**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	25	$ 7,611.50	$ 304.46		0	25	25	25	25	25
Advanced Water Conservation Measures	118	$ 13,271.42	$ 112.47		15	32	51	72	95	118
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	50	$ 25,275.50	$ 505.51		0	50	50	50	50	50
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Planned to interconnect with NAWSC's Brackish Desalination Plant

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,896	1,732	1,475	1,181	838	459

WATER SUPPLY AND DEMAND ANALYSIS

EDCOUCH

Year		2010	2020	2030	2040	2050	2060
Total Population	3342	3,778	4,287	4,858	5,475	6,149	6,841
Total Water Demand		521	591	669	754	847	943
Advanced Water Conservation WMS (ac-ft)		21	43	65	86	103	115
Net Water Demand (ac-ft)		**500**	**548**	**604**	**668**	**744**	**828**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	812	1,340.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**1,340.0**		**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**
Projected Supply Surplus/Deficit				**840**	**792**	**736**	**672**	**596**	**512**

Evaluation of Selected Water Management Strategies **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	26	$ 2,909.39	$ 112.47		3	7	11	16	21	26
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Hidalgo County ID #9

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	843	799	748	688	617	538

WATER SUPPLY AND DEMAND ANALYSIS										
EDINBURG										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				48465	64,792	83,869	105,237	128,358	153,611	179,517
Total Water Demand					8,637	11,179	14,028	17,110	20,476	23,929
Advanced Water Conservation WMS (ac-ft)					363	752	1,061	1,582	1,893	2,212
Net Water Demand (ac-ft)					**8,274**	**10,427**	**12,967**	**15,528**	**18,583**	**21,717**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	801, 816	10,725.0	MUNI		10,225	10225	10225	10225	10225	10225
Groundwater		500.0	GW		500	500	500	500	500	500
Total Supply (AF/yr)		**11,225.0**			**10,725**	**10,725**	**10,725**	**10,725**	**10,725**	**10,725**
Projected Supply Surplus/Deficit					**2,451**	**298**	**-2,242**	**-4,803**	**-7,858**	**-10,992**
Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	969	$ 108,968.52	$ 112.47		121	262	420	591	777	969
Non-Potable Water Re-use	4,000	$ 1,660,880.00	$ 415.22		0	0	500	1,500	3,000	4,000
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	6,619	$ 3,592,206.10	$ 542.74		0	0	1,631	3,114	4,591	6,619
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	348	$ 158,694.33	$ 455.56		0	0	86	164	242	348
Desalination:										
Brackish Groundwater Desalination	25	$ 12,637.75	$ 505.51		0	0	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by HCID #1

Surplus/Deficit after WMS's	2,572	559	420	590	777	969

WATER SUPPLY AND DEMAND ANALYSIS

ELSA

Year					2010	2020	2030	2040	2050	2060
Total Population				5549	5,838	6,175	6,553	6,962	7,408	7,866
Total Water Demand					1,118	1,183	1,255	1,334	1,419	1,507
Advanced Water Conservation WMS (ac-ft)					20	48	73	101	116	123
Net Water Demand (ac-ft)					**1,098**	**1,135**	**1,182**	**1,233**	**1,303**	**1,384**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	812	1,840.0	MUNI							
Groundwater		0.0	GW							
Contracts										
Total Supply (AF/yr)		**1,840.0**			**1,840**	**1,840**	**1,840**	**1,840**	**1,840**	**1,840**
Projected Supply Surplus/Deficit					**742**	**705**	**658**	**607**	**537**	**456**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	17	$ 1,926.56	$ 112.47		2	5	7	10	14	17
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	100	$ 50,551.00	$ 505.51		0	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by HCCID #9

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	744	810	766	718	651	573

WATER SUPPLY AND DEMAND ANALYSIS

HIDALGO

Year					2010	2020	2030	2040	2050	2060
Total Population				7322	11,109	15,534	20,491	25,854	31,711	37,720
Total Water Demand					1,108	1,549	2,043	2,578	3,162	3,760
Advanced Water Conservation WMS (ac-ft)					50	104	184	261	320	380
Net Water Demand (ac-ft)					**1,058**	**1,445**	**1,859**	**2,317**	**2,842**	**3,380**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	857	12.5	MUNI		13	13	13	13	13	13
Groundwater		826.0	GW		1,693	1,693	1,693	1,693	1,693	1,693
Total Supply (AF/yr)		**838.5**			**1,706**	**1,706**	**1,706**	**1,706**	**1,706**	**1,706**
Projected Supply Surplus/Deficit					**647**	**261**	**-154**	**-612**	**-1,137**	**-1,674**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	650	$ 197,899.00	$ 304.46		110	250	350	450	550	650
Advanced Water Conservation Measures	225	$ 25,275.65	$ 112.47		28	61	97	137	180	225
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	973	$ 528,086.02	$ 542.74		0	0	0	154	558	973
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	51	$ 23,233.56	$ 455.56		0	0	0	8	29	51
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	785	572	293	137	180	225

WATER SUPPLY AND DEMAND ANALYSIS

HIDALGO COUNTY MUD #1

Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	3400	5,280	7,476	9,936	12,598	15,505	18,487
Total Water Demand		1,733	2,454	3,261	4,135	5,089	6,067
Advanced Water Conservation WMS (ac-ft)		30	67	100	141	174	207
Net Water Demand (ac-ft)		**1,703**	**2,387**	**3,161**	**3,994**	**4,915**	**5,860**

Current Water Supply	**Water Right Number**	**Amount**	**Type**						
Amistad-Falcon Water Right/Contracts	543	384.0	MUNI						
Groundwater		0.0	GW						
Contracts									
Total Supply (AF/yr)		**384.0**		**384**	**384**	**384**	**384**	**384**	**384**
Projected Supply Surplus/Deficit				**-1,319**	**-2,003**	**-2,777**	**-3,610**	**-4,531**	**-5,476**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	112	$ 12,544.70	$ 112.47		14	30	48	68	89	112
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	5,202	$ 2,823,442.03	$ 542.74		1,253	1,903	2,638	3,430	4,304	5,202
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	274	$ 124,732.33	$ 455.56		66	100	139	181	227	274
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	13	30	48	68	89	112

WATER SUPPLY AND DEMAND ANALYSIS

LA JOYA

Year					2010	2020	2030	2040	2050	2060
Total Population				3303	3,960	4,727	5,587	6,518	7,534	8,576
Total Water Demand					430	514	607	709	818	932
Advanced Water Conservation WMS (ac-ft)					22	42	69	95	118	134
Net Water Demand (ac-ft)					**408**	**472**	**538**	**614**	**700**	**798**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	864, 802	512.5	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**512.5**			**513**	**513**	**513**	**513**	**513**	**513**
Projected Supply Surplus/Deficit					**105**	**41**	**-26**	**-102**	**-187**	**-285**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	39	$ 4,384.45	$ 112.47		5	11	17	24	31	39
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	408	$ 150,294.96	$ 368.37		135	179	226	279	340	408
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Village of LaJoya water right and HCID #16 water right

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	245	230	217	201	184	162

WATER SUPPLY AND DEMAND ANALYSIS

LA VILLA

Year		2010	2020	2030	2040	2050	2060
Total Population	1305	1,305	1,305	1,305	1,305	1,305	1,305
Total Water Demand		240	240	240	240	240	240
Advanced Water Conservation WMS (ac-ft)		6	10	15	19	22	22
Net Water Demand (ac-ft)		**234**	**230**	**225**	**221**	**218**	**218**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	812	500.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**500.0**		**500**	**500**	**500**	**500**	**500**	**500**
Projected Supply Surplus/Deficit				**266**	**270**	**275**	**279**	**282**	**282**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by HCCID #9

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	266	270	275	279	282	282

WATER SUPPLY AND DEMAND ANALYSIS

MCALLEN

Year					2010	2020	2030	2040	2050	2060
Total Population				106414	127,458	152,045	179,586	209,386	241,933	275,322
Total Water Demand					29,268	34,914	41,239	48,081	55,555	63,222
Advanced Water Conservation WMS (ac-ft)					571	1,363	2,012	2,815	3,523	4,009
Net Water Demand (ac-ft)					**28,697**	**33,552**	**39,227**	**45,266**	**52,032**	**59,213**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	343, 846, 848, 808	33,548.8	MUNI		32,429	32,429	32,429	32,429	32,429	32,429
Groundwater		0.0	GW							
Contract to Edinburg		1,120.0								
Total Supply (AF/yr)		**32,428.8**			**32,429**	**32,429**	**32,429**	**32,429**	**32,429**	**32,429**
Projected Supply Surplus/Deficit					**3,732**	**-1,123**	**-6,799**	**-12,838**	**-19,603**	**-26,784**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	1,450	$ 441,467.00	$ 304.46		0	0	352	588	875	1,450
Advanced Water Conservation Measures	1,249	$ 140,445.43	$ 112.47		156	337	541	761	1,002	1,249
Non-Potable Water Re-use	9,893	$ 4,107,771.46	$ 415.22		0	0	0	2,349	5,287	9,893
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	7,220	$ 3,918,582.80	$ 542.74		0	0	727	4,085	5,320	7,220
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	380	$ 173,112.80	$ 455.56		0	0	120	215	280	380
Desalination:										
Brackish Groundwater Desalination	7,841	$ 3,963,703.91	$ 505.51		3,360	3360	5600	5600	7841	7841
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	7,248	2,575	541	761	1,002	1,249

WATER SUPPLY AND DEMAND ANALYSIS

MERCEDES

Year					2010	2020	2030	2040	2050	2060
Total Population				13649	14,546	15,595	16,770	18,041	19,429	20,853
Total Water Demand					1,955	2,096	2,254	2,425	2,612	2,803
Advanced Water Conservation WMS (ac-ft)					65	140	207	283	326	350
Net Water Demand (ac-ft)					**1,890**	**1,956**	**2,047**	**2,142**	**2,286**	**2,453**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	823, 812	3,595.0	MUNI		3,595	3,595	3,595	3,595	3,595	3,595
Groundwater		1,691.0	GW		1,691	1,691	1,691	1,691	1,691	1,691
Total Supply (AF/yr)		**5,286.0**			**5,286**	**5,286**	**5,286**	**5,286**	**5,286**	**5,286**
Projected Supply Surplus/Deficit					**3,396**	**3,330**	**3,239**	**3,144**	**3,000**	**2,833**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	53	$ 5,990.06	$ 112.47		7	14	23	32	43	53
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	560	$ 283,085.60	$ 505.51		560	560	560	560	560	560
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	3,963	3,904	3,822	3,736	3,603	3,447

WATER SUPPLY AND DEMAND ANALYSIS										
MISSION										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				45408	61,154	79,551	100,157	122,454	146,807	171,790
Total Water Demand					10,207	13,277	16,716	20,438	24,502	28,672
Advanced Water Conservation WMS (ac-ft)					343	713	1,122	1,646	1,973	2,309
Net Water Demand (ac-ft)					**9,864**	**12,564**	**15,594**	**18,792**	**22,529**	**26,363**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	806, 828, 849, 846	9,594.5	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**9,594.5**			**9,595**	**9,595**	**9,595**	**9,595**	**9,595**	**9,595**
Projected Supply Surplus/Deficit					**-270**	**-2,970**	**-6,000**	**-9,197**	**-12,934**	**-16,768**
Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	934	$ 105,085.46	$ 112.47		116	252	405	570	750	934
Non-Potable Water Re-use	4,548	$ 1,888,420.56	$ 415.22		140	310	1,400	2,437	3,474	4,548
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	11,660	$ 4,295,194.20	$ 368.37		130	2,100	4,040	6,200	8,900	11,660
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	560	$ 283,085.60	$ 505.51		0	560	560	560	560	560
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of Mission and United ID

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	116	253	405	569	750	934

WATER SUPPLY AND DEMAND ANALYSIS										
NORTH ALAMO WSC (Hidalgo County)										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				80960	114,538	153,770	197,713	245,263	297,197	350,473
Total Water Demand					12,317	16,535	21,261	26,374	31,959	37,688
Advanced Water Conservation WMS (ac-ft)					642	1,378	2,215	3,022	3,662	4,318
Net Water Demand (ac-ft)					**11,676**	**15,157**	**19,046**	**23,352**	**28,297**	**33,370**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	240, 461, 804, 805, 808, 808, 816		MUNI		19,400	19519.6	19626.7	19728.5	19831.3	19927.2
Groundwater			GW		1,258	1,265	1,272	1,279	1,286	1,292
Contracts										
Total Supply (AF/yr)					**20,658**	**20,785**	**20,899**	**21,007**	**21,117**	**21,219**
Projected Supply Surplus/Deficit*					**8,982**	**5,628**	**1,853**	**-2,345**	**-7,180**	**-12,151**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	1,993	$ 224,097.56	$ 112.47		248	538	863	1,215	1,599	1,993
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	902	$ 489,551.48	$ 542.74		0	0	0	0	0	902
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	48	$ 21,866.88	$ 455.56		0	0	0	0	0	48
Desalination:										
Brackish Groundwater Desalination	11,201	$ 5,662,217.51	$ 505.51		11,201	11201	11201	11201	11201	11201
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Based on water supply available for Hidalgo Cty only

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	20,431	17,367	13,917	10,071	5,619	1,993

WATER SUPPLY AND DEMAND ANALYSIS										
PALMHURST										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				4872	9,144	14,136	19,727	25,777	32,384	39,162
Total Water Demand					1,168	1,805	2,519	3,292	4,135	5,001
Advanced Water Conservation WMS (ac-ft)					11	16	22	29	36	44
Net Water Demand (ac-ft)					**1,157**	**1,789**	**2,497**	**3,263**	**4,099**	**4,957**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *		1,157.0	MUNI							
Groundwater		0.0	GW							
Contracts										
Total Supply (AF/yr)					**1,157**	**1,789**	**2,706**	**2,967**	**3,170**	**3,324**
Projected Supply Surplus/Deficit					**0**	**0**	**209**	**-296**	**-929**	**-1,633**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	254	$ 28,511.82	$ 112.47		32	68	110	155	203	254
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,551	$ 841,979.70	$ 542.74		0	0	0	281	883	1,551
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	82	$ 37,196.47	$ 455.56		0	0	0	15	46	82
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Sharyland WSC

Surplus/Deficit after WMS's	32	68	319	154	204	253

WATER SUPPLY AND DEMAND ANALYSIS

PALMVIEW

Year		2010	2020	2030	2040	2050	2060
Total Population	4107	6,258	8,771	11,586	14,632	17,959	21,372
Total Water Demand		897	1,258	1,661	2,098	2,575	3,064
Advanced Water Conservation WMS (ac-ft)		28	59	91	131	161	192
Net Water Demand (ac-ft)		**869**	**1,199**	**1,570**	**1,967**	**2,414**	**2,872**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*		869.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)**		**869.0**		**869**	**1,199**	**1,570**	**1,967**	**1,967**	**1,967**
Projected Supply Surplus/Deficit				**0**	**0**	**0**	**0**	**-447**	**-905**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	128	$ 14,355.69	$ 112.47		16	34	55	78	102	128
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	860	$ 466,756.40	$ 542.74		0	0	0	0	425	860
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	45	$ 20,636.87	$ 455.56		0	0	0	0	22	45
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by LaJoya WSC
**Total supply based on LaJoya WSC's water supply

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	16	34	55	78	102	127

WATER SUPPLY AND DEMAND ANALYSIS										
PENITAS										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				1167	1,201	1,241	1,285	1,333	1,385	1,439
Total Water Demand					153	158	164	170	177	184
Advanced Water Conservation WMS (ac-ft)					4	8	14	19	22	23
Net Water Demand (ac-ft)					**149**	**150**	**150**	**151**	**155**	**161**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	860, Various	162.5	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**162.5**			**162**	**163**	**163**	**164**	**164**	**164**
Projected Supply Surplus/Deficit					**13**	**13**	**13**	**13**	**9**	**3**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	2	$ 226.17	$ 112.47		0	1	1	1	2	2
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	13	14	14	15	10	5

WATER SUPPLY AND DEMAND ANALYSIS

PHARR

Year		2010	2020	2030	2040	2050	2060
Total Population	46660	59,571	74,656	91,553	109,836	129,805	150,291
Total Water Demand		8,808	11,039	13,537	16,240	19,193	22,222
Advanced Water Conservation WMS (ac-ft)		334	669	1,026	1,353	1,745	2,020
Net Water Demand (ac-ft)		**8,474**	**10,370**	**12,511**	**14,887**	**17,448**	**20,202**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	808, 874	8,591.0	MUNI						
Groundwater		1,190.0	GW						
Contracts									
Total Supply (AF/yr)		**9,781.0**		**9,781**	**9,781**	**9,781**	**9,781**	**9,781**	**9,781**
Projected Supply Surplus/Deficit				**1,307**	**-589**	**-2,730**	**-5,106**	**-7,667**	**-10,421**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	100	$ 30,446.00	$ 304.46		100	100	100	100	100	100
Advanced Water Conservation Measures	766	$ 86,168.21	$ 112.47		95	207	332	467	615	766
Non-Potable Water Re-use	50	$ 20,761.00	$ 415.22		50	50	50	50	50	50
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	8,522	$ 4,625,474.51	$ 542.74		0	345.8	1976	3948.2	6286.15	8522.45
Urbanization	1,300	$ 478,881.00	$ 368.37		0	75	500	800	900	1,300
Contract	449	$ 204,341.44	$ 455.56		0	18.2	104	207.8	330.85	448.55
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	1,552	207	331	467	614	766

WATER SUPPLY AND DEMAND ANALYSIS

PROGRESSO

Year					2010	2020	2030	2040	2050	2060
Total Population				4851	6,348	8,097	10,056	12,176	14,491	16,866
Total Water Demand					597	762	946	1,146	1,363	1,587
Advanced Water Conservation WMS (ac-ft)					21	45	79	109	130	151
Net Water Demand (ac-ft)					**576**	**717**	**867**	**1,037**	**1,233**	**1,436**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*		All supply is GW from MHWSC	MUNI							
Groundwater	576		GW							
Total Supply (AF/yr)**					**576**	**717**	**867**	**1,037**	**1,234**	**1,436**
Projected Supply Surplus/Deficit					**0**	**0**	**0**	**0**	**1**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	89	$ 9,990.36	$ 112.47		11	24	38	54	71	89
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by MHWSC
**Total Supply based on meeting demands through 2060

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	11	24	38	54	72	89

WATER SUPPLY AND DEMAND ANALYSIS

SAN JUAN

Year		2010	2020	2030	2040	2050	2060
Total Population	26229	39,074	54,082	70,892	89,081	108,947	129,327
Total Water Demand		3,720	5,149	6,750	8,482	10,373	12,314
Advanced Water Conservation WMS (ac-ft)		219	485	794	1,098	1,342	1,594
Net Water Demand (ac-ft)		**3,501**	**4,664**	**5,956**	**7,384**	**9,031**	**10,720**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	808, 873	3,023.3	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**3,023.3**		**3,023**	**3,023**	**3,023**	**3,023**	**3,023**	**3,023**
Projected Supply Surplus/Deficit				**-478**	**-1,641**	**-2,933**	**-4,361**	**-6,007**	**-7,697**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	762	$ 85,725.03	$ 112.47		95	206	330	465	612	762
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	7,312	$ 3,968,596.29	$ 542.74		454	1,560	2,786	4,143	5,708	7,312
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	385	$ 175,322.27	$ 455.56		24	82	147	218	300	385
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of San Juan and HID #2 water rights

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	95	207	331	465	612	762

WATER SUPPLY AND DEMAND ANALYSIS

SHARYLAND WSC

Year					2010	2020	2030	2040	2050	2060
Total Population				27988	31,885	36,438	41,538	47,057	53,085	59,268
Total Water Demand					5,036	5,755	6,561	7,432	8,384	9,361
Advanced Water Conservation WMS (ac-ft)					143	286	465	685	892	996
Net Water Demand (ac-ft)					**4,893**	**5,469**	**6,096**	**6,747**	**7,492**	**8,365**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	809, 816, 846	12,139.6	MUNI							
Groundwater		0.0	GW							
Contract to Edinburg, Palmhurst, Alton		5,623.0								
Total Supply (AF/yr)		**6,516.6**			**6,517**	**5,078**	**5,698**	**5,416**	**5,196**	**5,030**
Projected Supply Surplus/Deficit					**1,624**	**-392**	**-397**	**-1,331**	**-2,296**	**-3,335**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	231	$ 26,009.03	$ 112.47		29	62	100	141	186	231
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	3,168	$ 1,719,536.01	$ 542.74		0	372.4	377.15	1264.45	2181.2	3168.25
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	167	$ 75,964.63	$ 455.56		0	19.6	19.85	66.55	114.8	166.75
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,652	63	100	141	186	231

WATER SUPPLY AND DEMAND ANALYSIS										
SULLIVAN CITY										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				3998	5,528	7,315	9,317	11,483	13,849	16,276
Total Water Demand					557	737	939	1,158	1,396	1,641
Advanced Water Conservation WMS (ac-ft)					31	66	94	141	171	201
Net Water Demand (ac-ft)					**526**	**671**	**845**	**1,017**	**1,225**	**1,440**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	859, 521	685.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**685.0**			**685**	**858**	**1,029**	**1,029**	**1,029**	**1,029**
Projected Supply Surplus/Deficit					**159**	**187**	**184**	**12**	**-196**	**-411**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	91	$ 10,209.04	$ 112.47		11	25	39	55	73	91
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	390	$ 211,668.60	$ 542.74		0	0	0	0	186	390
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	21	$ 9,566.76	$ 455.56		0	0	0	0	10	21
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by LaJoya WSC

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	170	211	223	68	72	90

WATER SUPPLY AND DEMAND ANALYSIS

WESLACO

Year		2010	2020	2030	2040	2050	2060
Total Population	26935	30,878	35,485	40,645	46,229	52,328	58,584
Total Water Demand		5,707	6,558	7,512	8,544	9,671	10,828
Advanced Water Conservation WMS (ac-ft)		173	358	546	725	879	984
Net Water Demand (ac-ft)		**5,534**	**6,200**	**6,966**	**7,819**	**8,792**	**9,844**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	812, 824	8,576.2	MUNI						
Groundwater		0.0	GW						
Contract to NAWSC, MHWSC		495.0							
Total Supply (AF/yr)		**8,081.2**		**8,081**	**8,081**	**8,081**	**8,081**	**8,081**	**8,081**
Projected Supply Surplus/Deficit				**2,547**	**1,881**	**1,116**	**262**	**-711**	**-1,762**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	500	$ 152,230.00	$ 304.46	0	0	0	0	0	500
Advanced Water Conservation Measures	234	$ 26,315.85	$ 112.47	29	63	101	143	188	234
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	1,120	$ 790,596.80	$ 705.89	1,120	1120	1120	1120	1120	1120
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	135	$ 73,269.90	$ 542.74	0	0	0	0	0	135
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	7	$ 3,188.92	$ 455.56	0	0	0	0	0	7
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

***City of Weslaco and HCCID #9 water rights**

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	3,696	3,064	2,337	1,525	597	234

WATER SUPPLY AND DEMAND ANALYSIS

HEBBRONVILLE

Year					2010	2020	2030	2040	2050	2060
Total Population				4498	4,764	5,098	5,354	5,569	5,509	5,302
Total Water Demand					747	799	840	873	864	831
Advanced Water Conservation WMS (ac-ft)					16	40	60	81	86	83
Net Water Demand (ac-ft)					**731**	**759**	**780**	**792**	**778**	**748**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts			MUNI							
Groundwater*		900.0	GW							
Total Supply (AF/yr)		**900.0**			**900**	**900**	**900**	**900**	**900**	**900**
Projected Supply Surplus/Deficit					**169**	**141**	**120**	**108**	**122**	**152**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	8	$ 890.53	$ 112.47		2	4	6	8	7	6
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Based on well capacity of 0.8 MGD

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	171	145	126	116	130	158

WATER SUPPLY AND DEMAND ANALYSIS

EAGLE PASS

Year					2010	2020	2030	2040	2050	2060
Total Population				22413	23,800	25,267	26,654	27,856	28,956	29,849
Total Water Demand					5,012	5,321	5,613	5,866	6,098	6,286
Advanced Water Conservation WMS (ac-ft)					80	198	299	406	454	468
Net Water Demand (ac-ft)					**4,932**	**5,123**	**5,314**	**5,460**	**5,644**	**5,818**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	3998, 2671	8,667.0	MUNI							
Groundwater		0.0	GW							
Contract to El Indio WSC		1,253.0								
Total Supply (AF/yr)		**7,414.0**			**6,454**	**6,140**	**5,852**	**5,599**	**5,372**	**5,177**
Projected Supply Surplus/Deficit					**1,522**	**1,017**	**538**	**139**	**-272**	**-641**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	55	$ 6,182.96	$ 112.47		10	21	31	40	48	55
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination**	641	$ 324,031.91	$ 505.51		0	260	260	260	272	641
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of Eagle Pass and Maverick County WID water rights
** Desal as an option in the future as indicated in survey

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	1,532	1,298	829	439	48	55

WATER SUPPLY AND DEMAND ANALYSIS										
EL INDIO WSC										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				5235	6,994	8,855	10,615	12,140	13,536	14,668
Total Water Demand					1,293	1,637	1,962	2,244	2,502	2,711
Advanced Water Conservation WMS (ac-ft)					39	69	107	136	167	181
Net Water Demand (ac-ft)					**1,254**	**1,568**	**1,855**	**2,108**	**2,335**	**2,530**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts		1,253.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**1,253.0**			**1,253**	**1,567**	**1,855**	**2,108**	**2,335**	**2,530**
Projected Supply Surplus/Deficit					**-1**	**-1**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	70	$ 7,843.45	$ 112.47		13	27	40	51	61	70
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1	$ 542.74	$ 542.74		1	1	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ 22.78	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	13	27	40	51	61	69

WATER SUPPLY AND DEMAND ANALYSIS										
LA GRULLA										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				1211	1,211	1,211	1,211	1,211	1,211	1,211
Total Water Demand					643	643	643	643	643	643
Advanced Water Conservation WMS (ac-ft)					4	8	12	16	19	19
Net Water Demand (ac-ft)					**639**	**635**	**631**	**627**	**624**	**624**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	863	522.1	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**522.1**			**522**	**522**	**522**	**522**	**522**	**522**
Projected Supply Surplus/Deficit					**-117**	**-113**	**-109**	**-105**	**-102**	**-102**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	111	$ 60,325.55	$ 542.74		111	107	104	100	97	97
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	6	$ 2,665.03	$ 455.56		6	6	5	5	5	5
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

Surplus/Deficit after WMS's	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS										
RIO GRANDE CITY										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				11923	13,061	14,277	15,529	16,791	18,035	19,229
Total Water Demand					2,633	2,879	3,131	3,386	3,636	3,877
Advanced Water Conservation WMS (ac-ft)					59	128	174	245	283	302
Net Water Demand (ac-ft)					**2,574**	**2,751**	**2,957**	**3,141**	**3,353**	**3,575**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	851	2,736.0	MUNI							
Groundwater		0.0	GW							
Contracts to El Tanque, El Salz, Rio WSC		257.2								
Total Supply (AF/yr)		**2,478.8**			**2,479**	**2,479**	**2,479**	**2,479**	**2,479**	**2,479**
Projected Supply Surplus/Deficit					**-96**	**-272**	**-478**	**-663**	**-874**	**-1,097**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	54	$ 6,074.87	$ 112.47		8	17	27	36	45	54
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,042	$ 565,616.49	$ 542.74		91	258	454	630	830	1,042
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	55	$ 24,987.47	$ 455.56		5	14	24	33	44	55
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

Surplus/Deficit after WMS's	9	17	26	36	45	54

WATER SUPPLY AND DEMAND ANALYSIS										
RIO WSC										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				2076	2,942	3,868	4,821	5,782	6,729	7,638
Total Water Demand					498	654	815	978	1,138	1,292
Advanced Water Conservation WMS (ac-ft)					13	30	43	65	75	86
Net Water Demand (ac-ft)					**485**	**624**	**772**	**913**	**1,063**	**1,206**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	339, 851	310.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**310.0**			**310**	**310**	**310**	**310**	**310**	**310**
Projected Supply Surplus/Deficit					**-175**	**-314**	**-462**	**-603**	**-753**	**-896**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	41	$ 4,624.75	$ 112.47		6	13	20	27	34	41
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	851	$ 461,980.29	$ 542.74		166	298	439	573	715	851
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	45	$ 20,409.09	$ 455.56		9	16	23	30	38	45
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Rio WSC water right and contract from Rio Grande City

Surplus/Deficit after WMS's	7	14	20	27	35	41

WATER SUPPLY AND DEMAND ANALYSIS										
ROMA CITY										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				9617	11,097	12,678	14,306	15,948	17,566	19,118
Total Water Demand					2,784	3,181	3,590	4,002	4,408	4,797
Advanced Water Conservation WMS (ac-ft)					62	128	192	250	295	321
Net Water Demand (ac-ft)					**2,722**	**3,053**	**3,398**	**3,752**	**4,113**	**4,476**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	730, 814	2,841.2	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**2,841.2**			**2,842**	**2,842**	**2,842**	**2,842**	**2,842**	**2,842**
Projected Supply Surplus/Deficit					**121**	**-211**	**-555**	**-910**	**-1,270**	**-1,633**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	70	$ 7,899.99	$ 112.47		11	23	35	47	59	70
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,552	$ 842,332.48	$ 542.74		0	200	527	864	1207	1552
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	82	$ 37,242.03	$ 455.56		0	10.6	27.85	45.55	63.6	81.75
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	131	22	34	47	59	71

WATER SUPPLY AND DEMAND ANALYSIS										
EL CENIZO										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				3545	5,929	8,729	11,865	15,315	19,085	23,068
Total Water Demand					697	1,027	1,396	1,801	2,245	2,713
Advanced Water Conservation WMS (ac-ft)					27	59	93	137	171	207
Net Water Demand (ac-ft)					**670**	**968**	**1,303**	**1,664**	**2,074**	**2,506**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	2720	879.9	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)**		**879.9**			**880**	**910**	**927**	**938**	**946**	**952**
Projected Supply Surplus/Deficit					**209**	**-59**	**-376**	**-725**	**-1,128**	**-1,554**

Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	144	$ 16,233.19	$ 112.47		18	38	62	87	115	144
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,476	$ 801,247.06	$ 542.74		0	56.05	357.2	688.75	1071.6	1476.3
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	78	$ 35,397.01	$ 455.56		0	2.95	18.8	36.25	56.4	77.7
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Webb County Water Utility
**Projected supply based on Webb County Water Utility supply

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	227	39	62	87	115	144

WATER SUPPLY AND DEMAND ANALYSIS

LAREDO

				2000	2010	2020	2030	2040	2050	2060
Year				2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				176,576	234,423	302,377	378,468	462,176	553,670	650,317
Total Water Demand					52,517	67,741	84,788	103,541	124,038	145,690
Advanced Water Conservation WMS (ac-ft)					1,050	2,710	4,239	5,695	7,442	8,741
Net Water Demand (ac-ft)					**51,467**	**65,031**	**80,549**	**97,846**	**116,596**	**136,949**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	3997	46,037.1	MUNI		46,037	46037.1	46037.1	46037.1	46037.1	46037.1
Groundwater		137.0	GW		137.0	137.0	137.0	137.0	137.0	137.0
Total Supply (AF/yr)		**46,174.1**			**46,174**	**46,174**	**46,174**	**46,174**	**46,174**	**46,174**
Projected Supply Surplus/Deficit					**-5,293**	**-18,857**	**-34,375**	**-51,672**	**-70,422**	**-90,775**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	24,471	$ 7,450,440.66	$ 304.46		1,553	5,000	15,000	24,471	24,471	24,471
Advanced Water Conservation Measures	3,502	$ 393,911.24	$ 112.47		428	930	1,493	2,111	2,788	3,502
Non-Potable Water Re-use	11,200	$ 4,650,464.00	$ 415.22		1,120	5,600	5,600	5,600	5,600	11,200
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	28,092	$ 15,246,652.08	$ 542.74		1,425	2,524	7,766	9,378	14,542	28,092
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	1,109	$ 505,102.15	$ 455.56		75	133	409	494	621	1,109
Desalination:										
Brackish Groundwater Desalination	22,400	$ 11,323,424.00	$ 505.51		1,120	5,600	5,600	11,200	22,400	22,400
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	428	930	1,493	1,582	0	0

WATER SUPPLY AND DEMAND ANALYSIS

RIO BRAVO

Year					2010	2020	2030	2040	2050	2060
Total Population				5553	8,318	11,566	15,203	19,205	23,579	28,199
Total Water Demand					1,137	1,581	2,078	2,625	3,222	3,854
Advanced Water Conservation WMS (ac-ft)					47	91	153	215	264	316
Net Water Demand (ac-ft)					**1,090**	**1,490**	**1,925**	**2,410**	**2,958**	**3,538**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	2720	1,234.4	MUNI							
Groundwater		0.0	GW							
Contracts										
Total Supply (AF/yr)		**1,234.4**			**1,234**	**1,205**	**1,188**	**1,177**	**1,169**	**1,164**
Projected Supply Surplus/Deficit*					**144**	**-285**	**-737**	**-1,233**	**-1,789**	**-2,375**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	167	$ 18,829.94	$ 112.47		20	44	71	101	133	167
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	2,256	$ 1,224,557.13	$ 542.74		0	270.75	700.15	1171.35	1699.55	2256.25
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	119	$ 54,097.75	$ 455.56		0	14.25	36.85	61.65	89.45	118.75
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Webb County Water Utility
**Projected supply based on Webb County Water Utility supply

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	164	44	72	101	133	168

WATER SUPPLY AND DEMAND ANALYSIS

WEBB COUNTY WATER UTILITY

Year		2010	2020	2030	2040	2050	2060
Total Population	851	1,326	1,884	2,509	3,197	3,949	4,743
Total Water Demand		247	350	467	594	734	882
Advanced Water Conservation WMS (ac-ft)		7	15	25	36	44	53
Net Water Demand (ac-ft)		**240**	**335**	**442**	**558**	**690**	**829**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	2720	2,311.1	MUNI						
Groundwater		0.0	GW						
Contract to Rio Bravo and El Cenizo		2,114.0							
Total Supply (AF/yr)		**197.1**		**197**	**196**	**196**	**196**	**196**	**196**
Projected Supply Surplus/Deficit				**-43**	**-139**	**-246**	**-362**	**-494**	**-633**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	29	$ 3,236.16	$ 112.47		4	8	12	17	23	29
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	601	$ 326,376.70	$ 542.74		41	132	234	344	469	601
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	32	$ 14,418.47	$ 455.56		2	7	12	18	25	32
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	4	8	13	17	23	29

WATER SUPPLY AND DEMAND ANALYSIS										
LYFORD										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				1973	2,091	2,207	2,313	2,398	2,456	2,485
Total Water Demand					307	324	339	352	360	365
Advanced Water Conservation WMS (ac-ft)					9	17	26	35	39	39
Net Water Demand (ac-ft)					**298**	**307**	**313**	**317**	**321**	**326**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	811, 821	980.3	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**980.3**			**980**	**980**	**980**	**980**	**980**	**980**
Projected Supply Surplus/Deficit					**683**	**674**	**667**	**663**	**659**	**654**
Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	4	$ 425.72	$ 112.47		1	2	3	3	4	4
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	100	$ 50,551.00	$ 505.51		0	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Delta Lake ID
*Interconnect with Willacy Desal. Plant

Surplus/Deficit after WMS's	684	775	770	766	762	758

WATER SUPPLY AND DEMAND ANALYSIS										
NORTH ALAMO WSC (Willacy County)										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				5696	7,187	8,649	9,981	11,052	11,781	12,141
Total Water Demand					773	930	1,073	1,188	1,267	1,306
Advanced Water Conservation WMS (ac-ft)					40	78	112	136	145	150
Net Water Demand (ac-ft)					**733**	**853**	**961**	**1,052**	**1,122**	**1,156**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts			MUNI		1,217	1097.9	990.799	889.001	786.122	690.312
Groundwater			GW		79	71	64	58	51	51
Total Supply (AF/yr)		**1,296.2**			**1,296**	**1,169**	**1,055**	**947**	**837**	**741**
Projected Supply Surplus/Deficit*					**563**	**317**	**94**	**-105**	**-285**	**-415**
Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	48	$ 5,358.96	$ 112.47		11	22	32	40	45	48
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	11,201	$ 5,662,217.51	$ 505.51		11,201	11201	11201	11201	11201	11201
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Based on water available for Willacy County only

Surplus/Deficit after WMS's	11,776	11,539	11,327	11,135	10,961	10,834

WATER SUPPLY AND DEMAND ANALYSIS										
RAYMONDVILLE										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				9733	10,071	10,402	10,704	10,947	11,112	11,194
Total Water Demand					1,726	1,783	1,834	1,876	1,904	1,918
Advanced Water Conservation WMS (ac-ft)					2	5	7	9	10	11
Net Water Demand (ac-ft)					**45**	**82**	**120**	**159**	**174**	**176**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	811	5,670.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**5,670.0**			**5,670**	**5,670**	**5,670**	**5,670**	**5,670**	**5,670**
Projected Supply Surplus/Deficit					**5,625**	**5,588**	**5,550**	**5,511**	**5,496**	**5,494**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	11	$ 1,214.81	$ 112.47		2	5	7	9	10	11
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	100	$ 50,551.00	$ 505.51		0	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Delta Lake ID
*Interconnect with Willacy Desal. Plant

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	5,627	5,693	5,657	5,620	5,606	5,605

WATER SUPPLY AND DEMAND ANALYSIS

SAN PERLITA

Year		2010	2020	2030	2040	2050	2060
Total Population	680	747	812	871	919	952	968
Total Water Demand		109	118	127	134	139	141
Advanced Water Conservation WMS (ac-ft)		3	6	10	13	15	15
Net Water Demand (ac-ft)		**106**	**112**	**117**	**121**	**124**	**126**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *		120.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**120.0**		**120**	**120**	**120**	**120**	**120**	**120**
Projected Supply Surplus/Deficit				**14**	**8**	**3**	**-1**	**-4**	**-6**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	2	$ 239.47	$ 112.47		0	1	1	2	2	2
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	25	$ 12,637.75	$ 505.51		25	25	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by NAWSC
*Interconnect with NAWSC Desal. Plant

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	40	34	29	26	23	21

WATER SUPPLY AND DEMAND ANALYSIS										
SEBASTIAN MUD										
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				1615	2,038	2,452	2,830	3,134	3,340	3,442
Total Water Demand					267	321	371	411	438	451
Advanced Water Conservation WMS (ac-ft)					11	25	38	49	56	58
Net Water Demand (ac-ft)					**256**	**296**	**333**	**362**	**382**	**393**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	803	300.0	MUNI							
Groundwater		0.0	GW							
Total Supply (AF/yr)		**300.0**			**300**	**300**	**300**	**300**	**300**	**300**
Projected Supply Surplus/Deficit					**44**	**4**	**-33**	**-62**	**-82**	**-93**
Evaluation of Selected Water Management Strategies					**Additional Supply by Decade**					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	14	$ 1,519.13	$ 112.47		3	6	9	11	13	14
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	88	$ 47,951.08	$ 542.74		0	0	31.35	58.9	77.9	88.35
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	5	$ 2,118.35	$ 455.56		0	0	1.65	3.1	4.1	4.65
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

***Supplied by LaFeria ID, CCID #3**

Surplus/Deficit after WMS's	48	10	9	11	13	13

WATER SUPPLY AND DEMAND ANALYSIS

ZAPATA

Year		2010	2020	2030	2040	2050	2060
Total Population	4856	4,856	4,856	4,856	4,856	4,856	4,856
Total Water Demand		1,050	1,050	1,050	1,050	1,050	1,050
Advanced Water Conservation WMS (ac-ft)		16	33	49	65	76	76
Net Water Demand (ac-ft)		**1,034**	**1,017**	**1,001**	**985**	**974**	**974**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	803, 2804, 2806	1,905.2	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**1,905.2**		**1,905**	**1,905**	**1,905**	**1,905**	**1,905**	**1,905**
Projected Supply Surplus/Deficit				**872**	**888**	**904**	**920**	**931**	**931**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	872	888	904	920	931	931

APPENDIX C

DECISION DOCUMENTS

County Water Supplies
Municipal Water Supply/Demand Analysis
Irrigation Water Supply/Demand Analysis
Manufacturing Water Supply/Demand Analysis
Livestock Water Supply/Demand Analysis
Steam Electric Water Supply/Demand Analysis
Mining Water Supply/Demand Analysis

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

CAMERON COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
BROWNSVILLE (Note 1)	130119000	M	119	80	31	22	02		M	31	23	230A0	AMISTAD/FALCON	28,395	29,060	29,060	29,060	29,060	29,060	29,060
BROWNSVILLE	130119000	M	119	80	31	23	02		M	31	23	230A0	AMISTAD/FALCON	226	226	226	226	225	226	225
BROWNSVILLE	130119000	M	119	80	31	22	01		M	31	23	03115	GULF COAST		7,740	7,740	7,740	7,740	7,740	7,740
BROWNSVILLE	130119000	M	119	80	31	23	01		M	31	23	03115	GULF COAST		60	60	60	60	60	60
COMBES	130192000	M	192	690	31	22	02		M	31	23	230A0	AMISTAD/FALCON	230	430	430	430	430	430	430
EAST RIO HONDO WSC	130753000	M		4099	31	22	02		M	31	23	230A0	AMISTAD/FALCON		5,046	5,046	5,046	5,046	5,046	5,046
EL JARDIN	134103000	M		4103	31	22	02		M	31	23	230A0	AMISTAD/FALCON		1,590	1,590	1,590	1,590	1,590	1,590
EL JARDIN	134103000	M		4103	31	22	02		M	31	23	230A0	AMISTAD/FALCON		10	10	10	10	10	10
HARLINGEN	130381000	M	381	265	31	22	02		M	31	23	230A0	AMISTAD/FALCON	18,385	16,621	16,621	16,621	16,621	16,621	16,621
INDIAN LAKE	131026000	M		1026	31	22	02		M	31	23	230A0	AMISTAD/FALCON		31	31	31	31	31	31
LA FERIA	130484000	M	484	333	31	22	02		M	31	23	230A0	AMISTAD/FALCON	1,800	1,800	1,800	1,800	1,800	1,800	1,800
LAGUNA MADRE WD	134224000	M		4224	31	22	02		M	31	23	230A0	AMISTAD/FALCON		3,948	3,948	3,948	3,948	3,948	3,948
LAGUNA VISTA	130497000	M	497	788	31	22	02		M	31	23	230A0	AMISTAD/FALCON	334	1,022	1,022	1,022	1,022	1,022	1,022
LOS FRESNOS	130543000	M	543	369	31	22	02		M	31	23	230A0	AMISTAD/FALCON	850	1,102	1,102	1,102	1,102	1,102	1,102
LOS INDIOS	131040000	M		1040	31	22	01		M	31	22	03115	GULF COAST		230	271	311	354	396	439
MILITARY HIGHWAY WSC	134255000	M		4255	31	22	01		M	31	23	230A0	AMISTAD/FALCON		1396	1396	1396	1396	1,396	1396
MILITARY HIGHWAY WSC	134255000	M		4255	31	22	01		M	31	23	03115	GULF COAST		1127	1086	1010	902	768	626
MILITARY HIGHWAY WSC	134255000	M		4255	31	23	01		M	31	23	03115	GULF COAST		36	36	34	33	31	29
OLMITO WSC	134292000	M		4292	31	23	02		M	31	23	230A0	AMISTAD/FALCON		996	995	996	996	996	996
PALM VALLEY	130670000	M	670	793	31	22	02		M	31	23	230A0	AMISTAD/FALCON	406	331	319	309	300	293	288
PALM VALLEY ESTATES UD	134295000	M		4295	31	22	02		M	31	23	230A0	AMISTAD/FALCON		81	94	104	112	119	125
PORT ISABEL	130710000	M	710	477	31	22	02		M	31	23	230A0	AMISTAD/FALCON	3,861	756	756	756	756	756	756
PRIMERA	130723000	M	723	735	31	22	02		M	31	23	230A0	AMISTAD/FALCON	817	584	584	584	584	584	584
RANCHO VIEJO	130733000	M	733	943	31	22	02		M	31	23	230A0	AMISTAD/FALCON	200	827	827	827	827	827	827
RANCHO VIEJO	130733000	M	733	943	31	22	01		M	31	23	03115	GULF COAST	280	355	355	355	355	355	355
RIO HONDO	130753000	M	753	503	31	22	02		M	31	23	230A0	AMISTAD/FALCON	890	890	890	890	890	890	890
SAN BENITO	130791000	M	791	532	31	22	02		M	31	23	230A0	AMISTAD/FALCON	5,500	7,032	7,032	7,032	7,032	7,032	7,032
SANTA ROSA	130805000	M	805	541	31	22	02		M	31	23	230A0	AMISTAD/FALCON	900	900	900	900	900	900	900
SOUTH PADRE	130844000	M	844	805	31	22	02		M	31	23	230A0	AMISTAD/FALCON	2,999	1,754	1,754	1,754	1,754	1,754	1,754
VALLEY MUD #2	134369000	M		4369	31	22	02		M	31	23	230A0	AMISTAD/FALCON		561	79	79	79	79	79
VALLEY MUD #2	134369000	M		4369	31	23	02		M	31	23	230A0	AMISTAD/FALCON		95	83	71	59	46	34
VALLEY MUD #2	134369000	M		4369	31	22	01		M	31	23	03115	GULF COAST		302	265	226	188	148	110
VALLEY MUD #2	134369000	M		4369	31	23	01		M	31	23	03115	GULF COAST		51	45	38	32	25	19
COUNTY OTHER	130996031	M	996	757	31	22	02		M	31	23	230A0	AMISTAD/FALCON	19,637	13,090	13,078	13,068	13,059	13,052	13,047
COUNTY OTHER (Note 2)	130996031	M	996	757	31	22	00		M	31	22	22999	OTHER LOCAL SUPPLY	0	0	0	0	0	0	0
COUNTY OTHER	130996031	M	996	757	31	22	01		M	31	22	03115	GULF COAST	3,353	2,519	2,478	2,439	2,396	2,354	2,311
COUNTY OTHER	130996031	M	996	757	31	23	01		M	31	23	03115	GULF COAST	100	5	5	4	4	4	4
MUNICIPAL TOTAL														89,163	102,603	102,011	101,866	101,692	101,490	101,283
MANUFACTURING	131001031	M	1001	1001	31	22	02		M	31	23	230A0	AMISTAD/FALCON	1,354	20	20	20	20	20	20
MANUFACTURING	131001031	M	1001	1001	31	22	00		M	31	23	36421	INDIRECT REUSE	2,239	2,240	2,240	2,240	2,240	2,240	2,240
MANUFACTURING TOTAL														3,593	2,260	2,260	2,260	2,260	2,260	2,260
STEAM ELECTRIC TOTAL	131002031	M	1002	1002	31	22	02		M	31	23	230A0	AMISTAD/FALCON	2400	2400	2400	2400	2400	2400	2400

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

CAMERON COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MINING																				
MINING SURFACE WATER	131003031	M	1003	1003	31	22	02		M	31	23	230A0	AMISTAD/FALCON	4	4	4	4	4	4	4
MINING GROUND WATER	131003031	M	1003	1003	31	22	01		M	31	22	03115	GULF COAST	494	8	8	8	8	8	8
MINING TOTAL														498	12	12	12	12	12	12
IRRIGATION																				
IRRIGATION SURFACE WATER	131004031	M	1004	1004	31	22	02		M	31	23	230A0	AMISTAD/FALCON	214,002	212,340	210,224	208,259	206,295	204,330	202,516
IRRIGATION SURFACE WATER	131004031	M	1004	1004	31	23	02		M	31	23	230A0	AMISTAD/FALCON	10,300	10,220	10,118	10,023	9,929	9,834	9,747
IRRIGATION SURFACE WATER	131004031	M	1004	1004	31	23	00		M	31	23	36421	REUSE	236	239	239	239	239	239	239
IRRIGATION SURFACE WATER	131004031	M	1004	1004	31	22	00		M	31	22	22996	IRRIGATION LOCAL SUPPLY	2,610	2,610	2,610	2,610	2,610	2,610	2,610
IRRIGATION GROUND WATER	131004031	M	1004	1004	31	22	01		M	31	22	03115	GULF COAST	494	6,673	6,673	6,673	6,673	6,673	6,673
IRRIGATION TOTAL														227,642	232,082	229,864	227,804	225,746	223,686	221,785
LIVESTOCK																				
LIVESTOCK SURFACE WATER	131005031	M	1005	1005	31	23	02		M	31	23	230A0	AMISTAD/FALCON	73	0	0	0	0	0	0
LIVESTOCK SURFACE WATER	131005031	M	1005	1005	31	22	00		M	31	23	23997	LIVESTOCK LOCAL SUPPLY	826	0	0	0	0	0	0
LIVESTOCK GROUND WATER	131005031	M	1005	1005	31	22	01		M	31	22	03115	GULF COAST	597	1,048	1,048	1,048	1,048	1,048	1,048
LIVESTOCK GROUND WATER	131005031	M	1005	1005	31	23	01		M	31	22	03115	GULF COAST		55	55	55	55	55	55
LIVESTOCK TOTAL														1,496	1,103	1,103	1,103	1,103	1,103	1,103
COUNTY TOTAL														324,792	340,460	337,650	335,445	333,213	330,951	328,843

Note 1: Brownsville PUB has a muni right for 40,000 AF (Brownsville Wier) that is not considered in the supply total

Note 2: Although there are water rights located on water courses in this basin other than the Rio Grande, these water rights are based to a large extent on irrigation return flows with poor water quality, therefore,

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

HIDALGO COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
ALAMO	130005000	M	5	3	108	22	02		M	108	23	230A0	AMISTAD/FALCON	1,203	1,804	1,804	1,804	1,804	1,804	1,804
ALAMO	130401000	M	5	3	108	22	01		M	108	23	10815	GULF COAST	450	450	450	450	450	450	450
ALTON	130016000	M	16	675	108	22	03	N/A	M	108	23	230A0	AMISTAD/FALCON	1,096	3,346	4,153	2,615	2,637	2,653	2,666
DONNA	130250000	M	250	168	108	22	02		M	108	23	230A0	AMISTAD/FALCON	4,190	4,190	4,190	4,190	4,190	4,190	4,190
EDCOUCH	130265000	M	265	178	108	22	02		M	108	23	230A0	AMISTAD/FALCON	1,340	1,340	1,340	1,340	1,340	1,340	1,340
EDINBURG	130269000	M	269	182	108	22	02		M	108	23	230A0	AMISTAD/FALCON	7,981	10,225	10,225	10,225	10,225	10,225	10,225
EDINBURG	130269000	M	269	182	108	22	01		M	108	22	10815	GULF COAST		500	500	500	500	500	500
ELSA	130281000	M	281	190	108	22	02		M	108	23	230A0	AMISTAD/FALCON	1,840	1,840	1,840	1,840	1,840	1,840	1,840
HIDALGO	130401000	M	401	275	108	22	02		M	108	23	230A0	AMISTAD/FALCON	13	13	13	13	13	13	13
HIDALGO	130401000	M	401	275	108	22	01		M	108	22	10815	GULF COAST	1,693	1,693	1,693	1,693	1,693	1,693	1,693
HIDALGO COUNTY MUD #1	134204000	M		4204	108	22	2		M	108	22	230A0	AMISTAD/FALCON		384	384	384	384	384	384
LA JOYA	130487000	M	487	336	108	22	02		M	108	22	230A0	AMISTAD/FALCON	669	360	360	360	360	360	360
LA JOYA	130487000	M	487	336	108	22	02				23		AMISTAD/FALCON		152	152	152	152	152	152
LA VILLA	130492000	M	492	349	108	22	02		M	108	23	230A0	AMISTAD/FALCON	500	500	500	500	500	500	500
MCALLEN	130574000	M	574	376	108	22	02		M	108	23	230A0	AMISTAD/FALCON	22,299	32,424	32,424	32,424	32,424	32,424	32,424
MCALLEN	130574000	M	574	376	108	22	03	N/A	M	108	23	230A0	AMISTAD/FALCON	11,250	4	4	4	4	4	4
MERCEDES	130588000	M	588	397	108	22	02		M	108	23	230A0	AMISTAD/FALCON	3,595	3,595	3,595	3,595	3,595	3,595	3,595
MERCEDES	130588000	M	588	397	108	22	01		M	108	22	10822	OTHER AQUIFER	232	1,691	1,691	1,691	1,691	1,691	1,691
MILITARY HIGHWAY WSC	134255000	M		4255	108	22	01		M	108	22	230A0	AMISTAD/FALCON		1,396	1,396	1,396	1,396	1,396	1,396
MILITARY HIGHWAY WSC	134255000	M		4255	108	22	01		M	108	22	10815	GULF COAST		898	760	649	546	444	345
MILITARY HIGHWAY WSC	134255000	M		4255	108	22	01		M	108	23	10815	GULF COAST		23	22	21	20	19	17
MISSION	130601000	M	601	408	108	22	02		M	108	23	230A0	AMISTAD/FALCON	10,289	9,595	9,595	9,595	9,595	9,595	9,595
NORTH ALAMO WSC	134273000	M		4273	108	22	02		M	108	23	230A0	AMISTAD/FALCON		19,400	19,520	19,627	19,728	19,831	19,927
NORTH ALAMO WSC	134273000	M		4273	108	22	01		M	108	23	10815	GULF COAST		1,258	1,265	1,272	1,279	1,286	1,292
PALM HURST	131051000	M		1051	108	22	01		M	108	23	230A0	AMISTAD/FALCON		1,157	1,789	2,706	2,967	3,170	3,324
PALM VIEW	130672000	M	672	794	108	22	02		M	108	23	230A0	AMISTAD/FALCON	313	869	1,199	1,570	1,967	1,967	1,967
PHARR	130693000	M	693	463	108	22	02		M	108	23	230A0	AMISTAD/FALCON	7,341	8,591	8,591	8,591	8,591	8,591	8,591
PHARR	130693000	M	693	463	108	22	01		M	108	22	10815	GULF COAST	1,190	1,190	1,190	1,190	1,190	1,190	1,190
PENITAS	131052000	M		1052	108	22	02		M	108	23	230A0	AMISTAD/FALCON		162	163	163	164	164	164
PROGRESO	130725000	M	725	941	108	22	02		M	108	23	10815	GULF COAST		576	717	867	1,037	1,234	1,436
SAN JUAN	130795000	M	795	536	108	22	02		M	108	23	230A0	AMISTAD/FALCON	2,346	3,023	3,023	3,023	3,023	3,023	3,023
SHARYLAND WSC	134333000	M		4333	108	22	02		M	108	23	230A0	AMISTAD/FALCON		6,517	5,078	5,698	5,416	5,196	5,030
SULLIVAN CITY	130868000	M	868	966	108	23	02		M	108	23	230A0	AMISTAD/FALCON	13	685	858	1,029	1,029	1,029	1,029
WESLACO	130950000	M	950	638	108	22	02		M	108	23	230A0	AMISTAD/FALCON	5,976	8,081	8,081	8,081	8,081	8,081	8,081
COUNTY OTHER	130996108	M	996	757	108	22	02		M	108	23	230A0	AMISTAD/FALCON	36,532	8,827	8,714	8,612	8,515	8,418	8,327
COUNTY OTHER	130996108	M	996	757	108	23	02		M	108	23	230A0	AMISTAD/FALCON	761	465	459	453	448	443	438
COUNTY OTHER	130996108	M	996	757	108	22	01		M	108	22	10815	GULF COAST	2,440	1,589	1,447	1,299	1,131	939	743

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

HIDALGO COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
COUNTY OTHER	130996108	M	996	757	108	23	01		M	108	23	10815	GULF COAST	7	93	86	78	68	57	45
MUNICIPAL TOTAL														125,559	138,904	139,270	139,699	139,993	139,890	139,790
MANUFACTURING	131001108	M	1001	1001	108	22	02		M	108	23	230A0	AMISTAD/FALCON	3,718	3,240	3,240	3,240	3,240	3,240	3,240
MANUFACTURING GRD WATER	131001108	M	1001	1001	108	22	01		M	108	22	10815	GULF COAST	60	908	908	908	908	908	908
MANUFACTURING GRD WATER	131001108	M	1001	1001	108	23	01		M	108	23	10815	GULF COAST	17	0	0	0	0	0	0
MANUFACTURING TOTAL														3,795	4,148	4,148	4,148	4,148	4,148	4,148
STEAM ELECTRIC																				
STEAM ELEC. SURFACE WATER	131002108	M	1002	1002	108	22	02		M	108	23	230A0	AMISTAD/FALCON	6,243	5,941	5,941	5,941	5,941	5,941	5,941
STEAM ELEC. SURFACE WATER	131002108	M	1002	1002	108	22	00		M	108	23	36426	REUSE	9,856	5,040	5,040	5,040	5,040	5,040	5,040
STEAM ELEC. GROUND WATER	131002108	M	1002	1002	108	22	01		M	108	23	10815	GULF COAST	1,190	1,190	1,190	1,190	1,190	1,190	1,190
STEAM ELECTRIC TOTAL														17,289	12,171	12,171	12,171	12,171	12,171	12,171
MINING																				
MINING	131003108	M	1003	1003	108	22	02		M	108	23	230A0	AMISTAD/FALCON	174	183	182	181	179	177	175
MINING	131003108	M	1003	1003	108	23	02		M	108	23	230A0	AMISTAD/FALCON	33	23	22	21	21	21	20
MINING GROUND WATER	131003108	M	1003	1003	108	22	01		M	108	22	10815	GULF COAST	928	1,291	1,398	1,462	1,526	1,589	1,644
MINING GROUND WATER	131003108	M	1003	1003	108	23	01		M	108	23	10815	GULF COAST	272	151	163	171	178	185	192
MINING TOTAL														1,407	1,648	1,765	1,835	1,904	1,972	2,031
IRRIGATION																				
IRRIGATION SURFACE WATER	131004108	M	1004	1004	108	22	02		M	108	23	230A0	AMISTAD/FALCON	360,331	357,532	353,969	350,661	347,353	344,045	340,991
IRRIGATION SURFACE WATER	131004108	M	1004	1004	108	23	02		M	108	23	230A0	AMISTAD/FALCON	2,928	2,905	2,877	2,850	2,823	2,796	2,771
IRRIGATION SURFACE WATER	131004108	M	1004	1004	108	23	00		M	108	23	36426	REUSE	166	4,288	4,288	4,288	4,288	4,288	4,288
IRRIGATION SURFACE WATER (Note 1)	131004108	M	1004	1004	108	22	00		M	108	22	22996	IRRIGATION LOCAL SUPPLY	79	79	79	79	79	79	79
IRRIGATION GROUND WATER	131004108	M	1004	1004	108	22	01		M	108	22	10815	GULF COAST	4,330	19,383	19,383	19,383	19,383	19,383	19,383
IRRIGATION GROUND WATER	131004108	M	1004	1004	108	23	01		M	108	23	10815	GULF COAST	185	1,020	1,020	1,020	1,020	1,020	1,020
IRRIGATION TOTAL														368,019	385,207	381,616	378,281	374,946	371,611	368,532
LIVESTOCK																				
LIVESTOCK SURFACE WATER	131005108	M	1005	1005	108	22	00		M	108	22	22997	LIVESTOCK LOCAL SUPPLY	725	0	0	0	0	0	0
LIVESTOCK SURFACE WATER	131005108	M	1005	1005	108	23	00		M	108	23	23997	LIVESTOCK LOCAL SUPPLY	38	0	0	0	0	0	0
LIVESTOCK GROUND WATER	131005108	M	1005	1005	108	22	01		M	108	22	10815	GULF COAST	71	647	647	647	647	647	647
LIVESTOCK GROUND WATER	131005108	M	1005	1005	108	23	01		M	108	23	10815	GULF COAST	21	34	34	34	34	34	34
LIVESTOCK TOTAL														855	681	681	681	681	681	681
COUNTY TOTAL														516,924	542,759	539,650	536,815	533,843	530,473	527,353

Note 1: Although there are water rights located on water courses in this basin other than the Rio Grande, these water rights are based to a large extent on irrigation return flows with poor water quality, therefore, they were set to 0.

All groundwater and livestock estimates are taken from historical use data provided by TWDB

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

JIM HOGG COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
HEBBRONVILLE	130389000	M	389	268	124	22	01		M	124	22	12415	GULF COAST	900	900	900	900	900	900	900
COUNTY OTHER	130996124	M	996	757	124	22	01		M	124	22	12415	GULF COAST	331	77	77	77	77	77	77
COUNTY OTHER	130996124	M	996	757	124	23	01		M	124	23	12415	GULF COAST	65	9	9	9	9	9	9
MUNICIPAL TOTAL														1,296	986	986	986	986	986	986
MANUFACTURING TOTAL	131001124	M	1001	1001	124	22	01		M	124	23	12415	GULF COAST	0	0	0	0	0	0	0
STEAM ELECTRIC TOTAL	131002124	M	1002	1002	124	22	01		M	124	23	12415	GULF COAST	0	0	0	0	0	0	0
MINING																				
MINING GROUNDWATER	131003124	M	1003	1003	124	22	01		M	124	22	12415	GULF COAST	1,140	37	37	37	37	37	37
MINING GROUNDWATER	131003124	M	1003	1003	124	23	01		M	124	23	12415	GULF COAST	160	4	4	4	4	4	4
TOTAL MINING														1,300	41	41	41	41	41	41
IRRIGATION																				
IRRIGATION GROUNDWATER	131004124	M	1004	1004	124	22	01		M	124	22	12415	GULF COAST	4,799	735	735	735	735	735	735
IRRIGATION GROUNDWATER	131004124	M	1004	1004	124	23	01		M	124	23	12415	GULF COAST	1,614	82	82	82	82	82	82
IRRIGATION TOTAL														6,413	817	817	817	817	817	817
LIVESTOCK																				
LIVESTOCK SURFACE WATER	131005124	M	1005	1005	124	22	00		M	124	22	22997	LIVESTOCK LOCAL SUPPLY	120	0	0	0	0	0	0
LIVESTOCK SURFACE WATER	131005124	M	1005	1005	124	23	00		M	124	23	23997	LIVESTOCK LOCAL SUPPLY	139	0	0	0	0	0	0
LIVESTOCK GROUND WATER	131005124	M	1005	1005	124	22	01		M	124	22	12415	GULF COAST	636	383	383	383	383	383	383
LIVESTOCK GROUND WATER	131005124	M	1005	1005	124	23	01		M	124	23	12415	GULF COAST	89	135	135	135	135	135	135
LIVESTOCK TOTAL														984	518	518	518	518	518	518
COUNTY TOTAL														9,993	2,362	2,362	2,362	2,362	2,362	2,362

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

MAVERICK COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
EAGLE PASS	130258000	M	258	173	162	23	02		M	162	23	230A0	AMISTAD/FALCON	7,529	6,454	6,140	5,852	5,599	5,372	5,177
							02								0	0	0	0	0	0
EL INDIO WSC	134102000	M		4102	162	23	02		M	162	23	230A0	AMISTAD/FALCON		1,253	1,567	1,855	2,108	2,335	2,530
COUNTY OTHER	130996162	M	996	757	162	23	02		M	162	23	230A0	AMISTAD/FALCON	2,049	2,174	2,174	2,174	2,174	2,174	2,174
COUNTY OTHER	130996162	M	996	757	162	21	01		M	162	21	16210	CARRIZO-WILCOX	163	1	1	1	1	1	1
COUNTY OTHER	130996162	M	996	757	162	23	01		M	162	23	16210	CARRIZO-WILCOX	300	267	267	267	267	267	267
COUNTY OTHER	130996162	M	996	757	162	23	01		M	162	23	16222	OTHER AQUIFER	130	1	1	1	1	1	1
COUNTY OTHER	130996162	M	996	757	162	21	01		M	162	21	16222	OTHER AQUIFER	290	257	257	257	257	257	257
MUNICIPAL TOTAL														**10,461**	**10,407**	**10,407**	**10,407**	**10,407**	**10,407**	**10,407**
MANUFACTURING TOTAL	131001162	M	1001	1001	162	23	01		M	162	23	230A0	AMISTAD/FALCON	76	**114**	**114**	**114**	**114**	**114**	**114**
STEAM ELECTRIC TOTAL	131002162	M	1002	1002	162	23	02		M	162	23	230A0	AMISTAD/FALCON	0	**0**	**0**	**0**	**0**	**0**	**0**
MINING																				
MINING SURFACE WATER	131003162	M	1003	1003	162	23	02		M	162	23	230A0	AMISTAD/FALCON	35	35	35	34	34	34	33
MINING GROUND WATER	131003162	M	1003	1003	162	21	01		M	162	21	16210	CARRIZO-WILCOX	61	55	57	59	60	61	62
MINING GROUND WATER	131003162	M	1003	1003	162	23	01		M	162	23	16210	CARRIZO-WILCOX	55	24	26	26	27	27	28
MINING GROUND WATER	131003162	M	1003	1003	162	21	01		M	162	21	16222	OTHER AQUIFER	387	53	55	56	57	58	59
MINING GROUND WATER	131003162	M	1003	1003	162	23	01		M	162	23	16222	OTHER AQUIFER	55	24	25	25	25	26	26
MINING TOTAL														**593**	**191**	**197**	**200**	**203**	**206**	**208**
IRRIGATION																				
IRRIGATION SURFACE WATER	131004162	M	1004	1004	162	23	02		M	162	23	230A0	AMISTAD/FALCON	54,176	53,755	53,219	52,722	52,224	51,727	51,268
IRRIGATION SURFACE WATER	131004162	M	1004	1004	162	23	00		M	162	23	36430	REUSE	123	0	0	0	0	0	0
IRRIGATION SURFACE WATER (Note 1	131004162	M	1004	1004	162	23	00		M	162	23	3462302692	TRIBS TO RIO GRANDE	184	223	223	223	223	223	223
IRRIGATION SURFACE WATER (Note 1	131004162	M	1004	1004	162	23	00		M	162	23	3462302689	TRIBS TO RIO GRANDE	12	20	20	20	20	20	20
IRRIGATION GROUND WATER	131004162	M	1004	1004	162	21	01		M	162	21	16210	CARRIZO-WILCOX	37	729	729	729	729	729	729
IRRIGATION GROUND WATER	131004162	M	1004	1004	162	23	01		M	162	23	16210	CARRIZO-WILCOX	1,370	635	635	635	635	635	635
IRRIGATION GROUND WATER	131004162	M	1004	1004	162	21	01		M	162	21	16222	OTHER AQUIFER	879	4,224	4,224	4,224	4,224	4,224	4,224
IRRIGATION GROUND WATER	131004162	M	1004	1004	162	23	01		M	162	23	16222	OTHER AQUIFER	72	28	28	28	28	28	28
IRRIGATION TOTAL														**56,853**	**59,613**	**59,077**	**58,580**	**58,082**	**57,585**	**57,126**
LIVESTOCK																				
LIVESTOCK SURFACE WATER	131005162	M	1005	1005	162	23	00		M	162	23	22997	LIVESTOCK LOCAL SUPPLY	761	0	0	0	0	0	0
LIVESTOCK SURFACE WATER	131005162	M	1005	1005	162	21	00		M	162	21	21997	LIVESTOCK LOCAL SUPPLY	436	0	0	0	0	0	0
LIVESTOCK GROUND WATER	131005162	M	1005	1005	162	21	01		M	162	21	16210	CARRIZO-WILCOX	95	1	1	1	1	1	1

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

MAVERICK COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
LIVESTOCK GROUND WATER	131005162	M	1005	1005	162	23	01		M	162	23	16210	CARRIZO-WILCOX	87	80	80	80	80	80	80
LIVESTOCK GROUND WATER	131005162	M	1005	1005	162	21	01		M	162	21	16222	OTHER AQUIFER	141	103	103	103	103	103	103
LIVESTOCK GROUND WATER	131005162	M	1005	1005	162	23	01		M	162	23	16222	OTHER AQUIFER	19	76	76	76	76	76	76
LIVESTOCK TOTAL														1,539	259	259	259	259	259	259
														69,522	70,584	70,054	69,560	69,065	68,571	68,114
COUNTY TOTAL																				

Note 1: Available surface water supply is based on water rights located in water courses other than the Rio Grande, which are not supported by the Amistad/Falcon Reservoir System.

The available supply is equal to the maximum water rights diversion during drought.

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

STARR COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
LA GRULLA	130486000	M	486	335	214	23	02		M	214	23	230A0	AMISTAD/FALCON	467	522	522	522	522	522	522
RIO GRANDE CITY	130752000	M	752	502	214	23	02		M	214	23	230A0	AMISTAD/FALCON	2,468	2,479	2,479	2,479	2,479	2,479	2,479
RIO WSC	134319000	M		4319	214	23	2		M	214	23	230AO	AMISTAD/FALCON		310	310	310	310	310	310
ROMA-LOS SAENZ	130769000	M	769	515	214	23	02		M	214	23	230A0	AMISTAD/FALCON	2,842	2,842	2,842	2,842	2,842	2,842	2,842
COUNTY OTHER	130996214	M	996	757	214	22	02		M	214	23	230A0	AMISTAD/FALCON	177	30	30	30	30	30	30
COUNTY OTHER	130996214	M	996	757	214	23	02		M	214	23	230A0	AMISTAD/FALCON	1,744	751	751	751	751	751	751
COUNTY OTHER	130996214	M	996	757	214	22	01		M	214	22	21422	OTHER AQUIFER	9	3	3	3	3	3	3
COUNTY OTHER	130996214	M	996	757	214	23	01		M	214	23	21422	OTHER AQUIFER	305	74	74	74	74	74	74
COUNTY OTHER	130996214	M	996	757	214	23	01		M	214	23	21415	GULF COAST	1,888	748	748	748	748	748	748
MUNICIPAL TOTAL														9,900	7,760	7,760	7,760	7,760	7,760	7,760
MANUFACTURING TOTAL	131001214	M	1001	1001	214	22	02		M	214	23	230A0	AMISTAD/FALCON	0	0	0	0	0	0	0
STEAM ELECTRIC TOTAL	131002214	M	1002	1002	214	22	02		M	214	23	230A0	AMISTAD/FALCON	0	0	0	0	0	0	0
MINING																				
MINING SURFACE WATER	131003214	M	1003	1003	214	22	02		M	214	23	230A0	AMISTAD/FALCON	12	11	11	11	11	11	11
MINING SURFACE WATER	131003214	M	1003	1003	214	23	02		M	214	23	230A0	AMISTAD/FALCON	9	9	9	9	9	9	9
MINING GROUND WATER	131003214	M	1003	1003	214	22	01		M	214	22	21415	GULF COAST	775	701	722	731	740	749	760
MINING GROUND WATER	131003214	M	1003	1003	214	23	01		M	214	23	21415	GULF COAST	502	496	511	519	525	531	538
MINING GROUND WATER	131003214	M	1003	1003	214	22	01		M	214	22	21422	OTHER AQUIFER	229	69	71	72	73	74	75
MINING GROUND WATER	131003214	M	1003	1003	214	23	01		M	214	23	21422	OTHER AQUIFER	771	49	51	51	52	53	53
MIINING TOTAL														2,298	1,335	1,375	1,393	1,410	1,427	1,446
IRRIGATION																				
IRRIGATION SURFACE WATER	131004214	M	1004	1004	214	23	02		M	214	23	230A0	AMISTAD/FALCON	15,896	15,773	15,616	15,470	15,324	15,178	15,043
IRRIGATION GROUND WATER	131004214	M	1004	1004	214	22	01		M	214	22	21415	GULF COAST	470	180	180	180	180	180	180
IRRIGATION GROUND WATER	131004214	M	1004	1004	214	23	01		M	214	23	21415	GULF COAST	1,523	576	576	576	576	576	576
IRRIGATION GROUND WATER	131004214	M	1004	1004	214	22	01		M	214	22	21422	OTHER AQUIFER	229	18	18	18	18	18	18
IRRIGATION GROUND WATER	131004214	M	1004	1004	214	23	01		M	214	23	21422	OTHER AQUIFER	1,927	5,821	5,821	5,821	5,821	5,821	5,821
IRRIGATION TOTAL														20,045	22,368	22,211	22,065	21,919	21,773	21,638
LIVESTOCK																				
LIVESTOCK SURFACE WATER	131005214	M	1005	1005	214	23	00		M	214	23	23997	LIVESTOCK LOCAL SUPPLY	679	0	0	0	0	0	0
LIVESTOCK SURFACE WATER	131005214	M	1005	1005	214	22	00		M	214	22	22997	LIVESTOCK LOCAL SUPPLY	37	0	0	0	0	0	0
LIVESTOCK GROUND WATER	131005214	M	1005	1005	214	22	01		M	214	22	21415	GULF COAST	399	224	224	224	224	224	224
LIVESTOCK GROUND WATER	131005214	M	1005	1005	214	23	01		M	214	23	21415	GULF COAST	259	793	793	793	793	793	793

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

STARR COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
LIVESTOCK GROUND WATER	131005214	M	1005	1005	214	22	01		M	214	22	21422	OTHER AQUIFER	2	22	22	22	22	22	22
LIVESTOCK GROUND WATER	131005214	M	1005	1005	214	23	01		M	214	23	21422	OTHER AQUIFER	8	78	78	78	78	78	78
LIVESTOCK TOTAL														1,384	1,117	1,117	1,117	1,117	1,117	1,117
COUNTY TOTAL														33,627	32,580	32,463	32,335	32,206	32,077	31,961

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

WEBB COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
EL CENIZO	130273000	M	273	770	240	23	02		M	240	23	230A0	AMISTAD/FALCON	307	880	910	927	938	946	952
EL CENIZO	130273000	M	273	770	240	23	01		M	240	23	24010	CARRIZO-WILCOX	200	0	0	0	0	0	0
LAREDO	130510000	M	510	347	240	23	02		M	240	23	230A0	AMISTAD/FALCON	43573	46037	46037	46037	46037	46037	46037
LAREDO	130510000	M	510	347	240	23	01		M	240	23	24010	CARRIZO-WILCOX		137	137	137	137	137	137
RIO BRAVO	131055000	M		1055	240	23	02		M	240	23	230A0	AMISTAD/FALCON		1234	1205	1188	1177	1169	1164
WEBB COUNTY WATER UTILITY	134376000	M		4376	240	23	02		M	240	23	230A0	AMISTAD/FALCON		197	196	196	196	196	196
COUNTY OTHER	130996240	M	996	757	240	21	02		M	240	23	230A0	AMISTAD/FALCON	2	0	0	0	0	0	0
COUNTY OTHER	130996240	M	996	757	240	22	02		M	240	23	230A0	AMISTAD/FALCON	6	0	0	0	0	0	0
COUNTY OTHER	130996240	M	996	757	240	23	02		M	240	23	230A0	AMISTAD/FALCON	1017	1	1	1	1	1	1
COUNTY OTHER	130996240	M	996	757	240	21	01		M	240	21	24010	CARRIZO-WILCOX	30	77	77	77	77	77	77
COUNTY OTHER	130996240	M	996	757	240	22	01		M	240	21	24010	CARRIZO-WILCOX		115	115	115	116	116	116
COUNTY OTHER	130996240	M	996	757	240	23	01		M	240	21	24010	CARRIZO-WILCOX		593	593	594	595	595	596
COUNTY OTHER	130996240	M	996	757	240	21	01		M	240	21	24015	GULF COAST	286	27	27	27	27	27	27
COUNTY OTHER	130996240	M	996	757	240	22	01		M	240	22	24015	GULF COAST	1,236	40	40	40	40	40	40
COUNTY OTHER	130996240	M	996	757	240	23	01		M	240	22	24015	GULF COAST	59	207	207	207	207	207	208
COUNTY OTHER	130996240	M	996	757	240	21	01		M	240	22	24022	OTHER AQUIFER	2	13	13	13	13	13	13
COUNTY OTHER	130996240	M	996	757	240	22	01		M	240	22	24022	OTHER AQUIFER		19	19	19	19	19	19
COUNTY OTHER	130996240	M	996	757	240	23	01		M	240	23	24022	OTHER AQUIFER	119	99	99	99	99	99	99
MUNICIPAL TOTAL														46,837	49,676	49,677	49,678	49,679	49,680	49,681
MANUFACTURING																				
MANUFACTURING SURFACE	131001240	M	1001	1001	240	23	02		M	240	23	230A0	AMISTAD/FALCON	43	0	0	0	0	0	0
MANUFACTURING GROUND	131001240	M	1001	1001	240	21	01		M	240	21	24022	OTHER AQUIFER	4	3	3	3	4	4	4
MANUFACTURING GROUND	131001240	M	1001	1001	240	22	01		M	240	22	24022	OTHER AQUIFER	1	4	5	5	5	6	6
MANUFACTURING GROUND	131001240	M	1001	1001	240	23	01		M	240	23	24022	OTHER AQUIFER	5	21	23	26	28	29	32
MANUFACTURING TOTAL														53	28	31	34	37	39	42
STEAM ELECTRIC TOTAL	131002240	M	1002	1002	240	23	02		M	240	23	230A0	AMISTAD/FALCON	2,195	1,645	1,645	1,645	1,645	1,645	1,645
MINING																				
MINING SURFACE WATER	131003240	M	1003	1003	240	21	02		M	240	23	230A0	AMISTAD/FALCON	228	226	224	222	220	218	216
MINING SURFACE WATER	131003240	M	1003	1003	240	22	02		M	240	23	230A0	AMISTAD/FALCON	313	311	308	305	302	299	297
MINING SURFACE WATER	131003240	M	1003	1003	240	23	02		M	240	23	230A0	AMISTAD/FALCON	111	110	109	108	107	106	104
MINING GROUND WATER	131003240	M	1003	1003	240	21	01		M	240	21	24010	CARRIZO-WILCOX	6,046	360	357	356	356	355	354
MINING GROUND WATER	131003240	M	1003	1003	240	23	01		M	240	23	24010	CARRIZO-WILCOX	3,122	158	156	156	155	155	154
MINING GROUND WATER	131003240	M	1003	1003	240	21	01		M	240	21	24015	GULF COAST	120	126	124	124	124	124	123

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

WEBB COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MINING GROUND WATER	131003240	M	1003	1003	240	22	01		M	240	22	24015	GULF COAST	518	96	95	95	95	95	94
MINING GROUND WATER	131003240	M	1003	1003	240	23	01		M	240	23	24015	GULF COAST	103	55	54	54	54	54	54
MINING GROUND WATER	131003240	M	1003	1003	240	21	01		M	240	21	24022	OTHER AQUIFER	9	60	60	59	59	59	59
MINING GROUND WATER	131003240	M	1003	1003	240	22	01		M	240	22	24022	OTHER AQUIFER	1	46	46	46	45	45	45
MINING GROUND WATER	131003240	M	1003	1003	240	23	01		M	240	23	24022	OTHER AQUIFER	10	26	26	26	26	26	26
MINING TOTAL														10,581	1,574	1,559	1,551	1,543	1,536	1,526
IRRIGATION																				
IRRIGATION SURFACE WATER	131004240	M	1004	1004	240	23	02		M	240	23	230A0	AMISTAD/FALCON	10,603	10,520	10,415	10,318	10,221	10,123	10,034
IRRIGATION SURFACE WATER	131004240	M	1004	1004	240	23	0		M	240	23	3462302694	TRIBS TO RIO GRANDE	30	20	20	20	20	20	20
IRRIGATION SURFACE WATER	131004240	M	1004	1004	240	23	0		M	240	23	3462302755	TRIBS TO RIO GRANDE	148	98	98	98	98	98	98
IRRIGATION SURFACE WATER	131004240	M	1004	1004	240	23	0		M	240	23	3462302760	TRIBS TO RIO GRANDE	30	33	33	33	33	33	33
IRRIGATION SURFACE WATER	131004240	M	1004	1004	240	23	0		M	240	23	3462303910	TRIBS TO RIO GRANDE	119	0	0	0	0	0	0
IRRIGATION SURFACE WATER	131004240	M	1004	1004	240	23	00		M	240	23	36437	REUSE	795	1,120	1,120	1,120	1,120	1,120	1,120
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	21	01		M	240	21	24010	CARRIZO-WILCOX	1,963	135	135	135	135	135	135
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	23	01		M	240	23	24010	CARRIZO-WILCOX	1,014	1,043	1,043	1,043	1,043	1,043	1,043
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	21	01		M	240	21	24015	GULF COAST	6	47	47	47	47	47	47
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	22	01		M	240	22	24015	GULF COAST	28	67	67	67	67	67	67
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	23	01		M	240	23	24015	GULF COAST	56	364	364	364	364	364	364
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	21	01		M	240	21	24022	OTHER AQUIFER	446	23	23	23	23	23	23
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	22	01		M	240	22	24022	OTHER AQUIFER	62	32	32	32	32	32	32
IRRIGATION GROUND WATER	131004240	M	1004	1004	240	23	01		M	240	23	24022	OTHER AQUIFER	492	174	174	174	174	174	174
IRRIGATION TOTAL														15,791	13,676	13,571	13,474	13,377	13,279	13,190
LIVESTOCK																				
LIVESTOCK SURFACE WATER	131005240	M	1005	1005	240	22	00		M	240	22	22997	LIVESTOCK LOCAL SUPPLY	313	0	0	0	0	0	0
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	21	01		M	240	21	24015	GULF COAST	37	153	153	153	153	153	153
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	22	01		M	240	22	24015	GULF COAST	159	21	21	21	21	21	21
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	23	01		M	240	23	24015	GULF COAST	37	174	174	174	174	174	174
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	21	01		M	240	21	24010	CARRIZO-WILCOX	11,170	440	440	440	440	440	440
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	23	01		M	240	23	24010	CARRIZO-WILCOX	5,768	499	499	499	499	499	499
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	21	01		M	240	21	24022	OTHER AQUIFER	36	73	73	73	73	73	73
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	22	01		M	240	22	24022	OTHER AQUIFER	5	70	70	70	70	70	70
LIVESTOCK GROUND WATER	131005240	M	1005	1005	240	23	01		M	240	23	24022	OTHER AQUIFER	39	83	83	83	83	83	83
LIVESTOCK TOTAL														17,564	1,513	1,513	1,513	1,513	1,513	1,513

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

WEBB COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
COUNTY TOTAL														93,021	68,112	67,996	67,895	67,794	67,692	67,597

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

WILLACY COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
COUNTY OTHER	130552000	M	552	373	245	22	02		M		23	230A0	AMISTAD/FALCON	1,058	980	980	980	980	980	980
NORTH ALAMO WSC	134273000			4273	245					108			AMISTAD/FALCON		1,217	1,098	991	889	786	690
NORTH ALAMO WSC	134273000			4273	245					108		10815	GULF COAST		79	71	64	58	51	51
RAYMONDVILLE	130738000	M	738	495	245	22	02		M	108	23	230A0	AMISTAD/FALCON	5,670	5,670	5,670	5,670	5,670	5,670	5,670
SAN PERLITA	130798000	M	798	956	245	22	02		M	108	23	230A0	AMISTAD/FALCON	107	120	120	120	120	120	120
SEBASTIAN	130815000	M	815	958	245	22	02		M	31	23	230A0	AMISTAD/FALCON	32	300	300	300	300	300	300
COUNTY OTHER	130996245	M	996	757	245	22	02		M	31	23	230A0	AMISTAD/FALCON	300	698	579	471	370	267	267
MUNICIPAL TOTAL														7,167	9,065	8,818	8,597	8,387	8,174	8,078
MANUFACTURING																				
MANUFACTURING	131001245	M	1001	1001	245	22	02		M	245	23	230A0	AMISTAD/FALCON	0	0	0	0	0	0	0
MANUFACTURING (Note 1)	131001245	M	1001	1001	245	22	00		M	245	22	22999	OTHER LOCAL SUPPLY	0	0	0	0	0	0	0
MANUFACTURING TOTAL														0	0	0	0	0	0	0
STEAM ELECTRIC TOTAL	131002245	M	1002	1002	245	22	02		M	245	23	230A0	AMISTAD/FALCON	0	0	0	0	0	0	0
MINING																				
MINING SURFACE WATER	131003245	M	1003	1003	245	22	02		M		23	230A0	AMISTAD/FALCON	7	0	0	0	0	0	0
MINING GROUND WATER	131003245	M	1003	1003	245	22	01		M	245	22	24515	GULF COAST	30	6	6	6	6	6	6
MINING TOTAL														37	6	6	6	6	6	6
IRRIGATION																				
IRRIGATION SURFACE WATER	131004245	M	1004	1004	245	22	02		M		23	230A0	AMISTAD/FALCON	34,525	34,257	33,915	33,598	33,281	32,964	32,672
IRRIGATION SURFACE WATER (Note 1	131004245	M	1004	1004	245	22	00		M	245	22	22996	IRRIGATION LOCAL SUPPLY	899	899	899	899	899	899	899
IRRIGATION GROUND WATER	131004245	M	1004	1004	245	22	01		M	245	22	24515	GULF COAST	30	0	0	0	0	0	0
IRRIGATION TOTAL														35,454	35,156	34,814	34,497	34,180	33,863	33,571
LIVESTOCK	131005245	M	1005	1005	245	22	01		M	245	22	24515	GULF COAST	240	151	151	151	151	151	151
COUNTY TOTAL														42,898	44,378	43,789	43,251	42,724	42,194	41,806

Note 1: Although there are water rights located on water courses in this basin other than the Rio Grande, these water rights are based to a large extent on irrigation return flows with poor water quality, therefore, the available supply has been set to zero.

RIO GRANDE REGIONAL WATER PLAN
TABLE 5 - CURRENT WATER SUPPLIES AVAILABLE TO REGION M

ZAPATA COUNTY

WATER USER GROUP NAME	WATER USER GROUP IDENTIFIER	RWPG OF WATER USER	SEQUENCE NUMBER	CITY NUMBER	COUNTY OF WATER USER	BASIN OF WATER USER	TYPE OF SUPPLY SOURCE	MAJOR WATER PROVIDER	RWPG OF SUPPLY	COUNTY OF SOURCE	BASIN OF SOURCE	SOURCE IDENTIFIER	SOURCE NAME	SUPPLY AVAILABLE FOR YEAR 2000	SUPPLY AVAILABLE FOR YEAR 2010	SUPPLY AVAILABLE FOR YEAR 2020	SUPPLY AVAILABLE FOR YEAR 2030	SUPPLY AVAILABLE FOR YEAR 2040	SUPPLY AVAILABLE FOR YEAR 2050	SUPPLY AVAILABLE FOR YEAR 2060
MUNICIPAL																				
ZAPATA	130994000	M	994	672	253	23	02		M	253	23	230A0	AMISTAD/FALCON	1,784	1,905	1,905	1,905	1,905	1,905	1,905
COUNTY OTHER	130996253	M	996	757	253	23	02		M	253	23	230A0	AMISTAD/FALCON	686	661	661	661	661	661	661
COUNTY OTHER	130996253	M	996	757	253	23	01		M	253	23	25315	OTHER AQUIFER	224	0	0	0	0	0	(
MUNICIPAL TOTAL														2,694	2,566	2,566	2,566	2,566	2,566	2,56(
MANUFACTURING TOTAL	131001253	M	1001	1001	253	23	02		M	253	23	230A0	AMISTAD/FALCON	0	0	0	0	0	0	(
STEAM ELECTRIC TOTAL	131002253	M	1002	1002	253	23	02		M	253	23	230A0	AMISTAD/FALCON	0	0	0	0	0	0	(
MINING																				
MINING SURFACE WATER	131003253	M	1003	1003	253	23	02		M	253	23	230A0	AMISTAD/FALCON	135	134	132	131	130	129	12
MINING GROUND WATER	131003253	M	1003	1003	253	23	01		M	253	23	25322	OTHER AQUIFER	1,000	0	0	0	0	0	
MINING TOTAL														1,135	134	132	131	130	129	12
IRRIGATION																				
IRRIGATION SURFACE WATER	1.31E+08	M	1004	1004	253	23	02		M	253	23	230A0	AMISTAD/FALCO	3,991	3,960	3,920	3,884	3,847	3,810	3,77
IRRIGATION GROUND WATER	1.31E+08	M	1004	1004	253	23	01		M	253	23	25322	OTHER AQUIFER	1,000	0	0	0	0	0	
IRRIGATION SURFACE WATER (Note 2)	131004253	M	1004	1004	253	23	00		M	253	23	3.5E+09	TRIBS TO RIO GRANDI	83	116	116	116	116	116	1
IRRIGATION TOTAL														5,074	4,076	4,036	4,000	3,963	3,926	3,89
LIVESTOCK																				
LIVESTOCK SURFACE WATEI	1.31E+08	M	1005	1005	253	23	00		M	253	23	23997	LIVESTOCK LOC/	446	0	0	0	0	0	
LIVESTOCK GROUND WATER	1.31E+08	M	1005	1005	253	23	01		M	253	23	25322	OTHER AQUIFER	80	474	474	474	474	474	4
LIVESTOCK TOTAL														526	474	474	474	474	474	4
COUNTY TOTAL														9,429	7,250	7,208	7,171	7,133	7,095	7,0

WATER SUPPLY AND DEMAND ANALYSIS

Municipal County Breakdown (ac-ft/yr)

WMS	Cameron County	Hidalgo	Jim Hogg	Maverick	Star	Webb	Willacy	Zapata	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)
Additional Groundwater	2,250	7,774	73	0	4,188	15,539	0	0	29,824	$ 9,080,215.04	$ 304.46
Advanced Water Conservation Measures	3,713	10,281	9	341	595	3,907	78	85	19,009	$ 2,137,995.43	$ 112.47
Non-Potable Water Re-use	600	18,991	0	0	50	11,200	0	0	30,841	$ 12,805,800.02	$ 415.22
Potable Water Re-use	0	1,120	0	0	0	0	0	0	1,120	$ 790,596.80	$ 705.89
Brownsville Weir and Reservoir	20,643	0	0	0	0	0	0	0	20,643	$ 11,090,864.61	$ 537.27
Acquisition of Water Rights:											
Purchase	15,435	58,856	8	2,227	10,455	55,061	88	1,813	143,944	$ 78,123,949.46	$ 542.74
Urbanization	0	15,245	0	0	0	0	0	0	15,245	$ 5,615,800.65	$ 368.37
Contract	847	2,256	0	0	132	1,337	5	0	4,577	$ 2,085,052.56	$ 455.56
Desalination:											
Brackish Groundwater Desalination	24,753	21,792	0	641	1,120	10,100	11,426	0	69,832	$ 35,300,774.32	$ 505.51
Seawater Desalination	7,902	0	0	0	0	0	0	0	7,902	$ 6,065,812.26	$ 767.63
Totals:	**76143.34865**	**136314.924**	**90.293001**	**3208.749**	**16541**	**97143**	**11596.9**	**1898.4**	**342,937**	**$ 163,096,861.16**	**$ 4,715.12**

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Zapata County

			2010	2020	2030	2040	2050	2060
Year								
Total Population		7,326	9,169	11,361	13,559	15,630	17,498	18,877
Total Water Demand			1,232	1,514	1,792	2,048	2,293	2,474
Advanced Water Conservation WMS (ac-ft)			14	30	46	61	75	85
Net Water Demand (ac-ft)			**1,218**	**1,484**	**1,746**	**1,987**	**2,218**	**2,389**
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		661	661	661	661	661	661
OTHER AQUIFER	Ground Water		0	0	0	0	0	0
Total Supply (AF/yr)			**661**	**661**	**661**	**661**	**661**	**661**
Projected Supply Surplus/Deficit			**-571**	**-853**	**-1,131**	**-1,387**	**-1,632**	**-1,813**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	85	$ 9,604.55	$ 112.47		14	30	46	61	75	85
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,813	$ 983,987.62	$ 542.74		571	853	1,131	1,387	1,632	1,813
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

585	883	1,177	1,448	1,707	1,898
14	30	46	61	75	85

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Willacy County

			2010	2020	2030	2040	2050	2060
Year								
Total Population		385	385	385	385	385	385	384
Total Water Demand			215	213	212	211	210	209
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		698	579	471	370	267	267
Total Supply (AF/yr)			698	579	471	370	267	267
Projected Supply Surplus/Deficit			483	366	259	159	57	58

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

0	0	0	0	0	0
483	366	259	159	57	58

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Webb County

Year			2010	2020	2030	2040	2050	2060
Total Population		6,592	7,651	8,895	10,287	11,817	13,491	15,259
Total Water Demand			1,388	1,575	1,786	2,025	2,296	2,599
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		0	0	0	0	0	0
AMISTAD/FALCON	Surface Water		0	0	0	0	0	0
AMISTAD/FALCON	Surface Water		1	1	1	1	1	1
CARRIZO-WILCOX	Ground Water		77	77	77	77	77	77
CARRIZO-WILCOX	Ground Water		115	115	115	116	116	116
CARRIZO-WILCOX	Ground Water		593	593	594	595	595	596
GULF COAST	Ground Water		27	27	27	27	27	27
GULF COAST	Ground Water		40	40	40	40	40	40
GULF COAST	Ground Water		207	207	207	207	207	208
OTHER AQUIFER	Ground Water		13	13	13	13	13	13
OTHER AQUIFER	Ground Water		19	19	19	19	19	19
OTHER AQUIFER	Ground Water		99	99	99	99	99	99
Total Supply (AF/yr)			**1,191**	**1,192**	**1,193**	**1,194**	**1,195**	**1,196**
Projected Supply Surplus/Deficit			**-197**	**-383**	**-593**	**-831**	**-1,101**	**-1,403**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	529	$ 161,059.34	$ 304.46		74	144	224	313	416	529
Advanced Water Conservation Measures	64	$ 7,206.53	$ 112.47		8	17	27	39	51	64
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	874	$ 474,354.76	$ 542.74		123	240	370	518	686	874
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

205	401	621	870	1,153	1,467
8	18	28	39	52	64

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Starr County

Year		2010	2020	2030	2040	2050	2060
Total Population	28,770	37,826	47,504	57,471	67,517	77,418	86,919
Total Water Demand		6,228	7,663	9,141	10,663	12,141	13,631

Current Water Supply	Type						
AMISTAD/FALCON	Surface Water	30	30	30	30	30	30
AMISTAD/FALCON	Surface Water	751	751	751	751	751	751
OTHER AQUIFER	Ground Water	3	3	3	3	3	3
OTHER AQUIFER	Ground Water	74	74	74	74	74	74
GULF COAST	Ground Water	748	748	748	748	748	748
Total Supply (AF/yr)		**1,607**	**1,607**	**1,607**	**1,607**	**1,607**	**1,607**
Projected Supply Surplus/Deficit		**-4,621**	**-6,056**	**-7,534**	**-9,056**	**-10,534**	**-12,024**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	4,138	$ 1,259,855.48	$ 304.46	1,580	3270	2981	3712	4022	4138
Advanced Water Conservation Measures	430	$ 48,350.35	$ 112.47	67	139	212	286	360	430
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	7,886	$ 4,280,047.64	$ 542.74	3,041	2786	4,553	5334	6,512	7886
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

4,688	6,195	7,746	9,332	10,894	12,454
67	138	212	276	359	430

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Maverick County

			2010	2020	2030	2040	2050	2060
Year								
Total Population		19,649	25,098	30,862	36,312	41,036	45,358	48,864
Total Water Demand			2,727	3,249	3,742	4,183	4,573	4,926

Current Water Supply	Type	2010	2020	2030	2040	2050	2060
AMISTAD/FALCON	Surface Water	2,174	2,174	2,174	2,174	2,174	2,174
CARRIZO-WILCOX	Ground Water	1	1	1	1	1	1
CARRIZO-WILCOX	Ground Water	267	267	267	267	267	267
OTHER AQUIFER	Ground Water	1	1	1	1	1	1
OTHER AQUIFER	Ground Water	257	257	257	257	257	257
Total Supply (AF/yr)		**2,700**	**2,700**	**2,700**	**2,700**	**2,700**	**2,700**
Projected Supply Surplus/Deficit		**-27**	**-549**	**-1,042**	**-1,483**	**-1,873**	**-2,226**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	216	$ 24,292.00	$ 112.47		40	83	123	158	190	216
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	2,226	$ 1,208,139.24	$ 542.74		27	549	1042	1483	1,873	2226
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

67	632	1,165	1,641	2,063	2,442
40	83	123	158	190	216

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Jim Hogg County

Year		2010	2020	2030	2040	2050	2060
Total Population	783	829	887	932	969	959	923
Total Water Demand		153	159	164	167	165	158

Current Water Supply	Type						
GULF COAST	Ground Water	77	77	77	77	77	77
GULF COAST	Ground Water	9	9	9	9	9	9
Total Supply (AF/yr)		**86**	**86**	**86**	**86**	**86**	**86**
Projected Supply Surplus/Deficit		**-67**	**-73**	**-78**	**-81**	**-79**	**-72**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	73	$ 22,225.58	$ 304.46		60	66	70	73	71	65
Advanced Water Conservation Measures	1	$ 154.66	$ 112.47		0	1	1	1	1	1
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	8	$ 4,341.92	$ 542.74		7	7	8	8	8	7
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

67	74	79	82	80	73
0	1	1	1	1	1

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Hidalgo County

Year			2010	2020	2030	2040	2050	2060
Total Population		60,808	80,235	109,064	141,351	176,285	214,445	253,592
Total Water Demand			9,886	13,072	16,626	20,536	24,981	29,542
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		8,827	8,714	8,612	8,515	8,418	8,327
AMISTAD/FALCON	Surface Water		465	459	453	448	443	438
GULF COAST	Ground Water		1,589	1,447	1,299	1,131	939	743
GULF COAST	Ground Water		93	86	78	68	57	45
Total Supply (AF/yr)			**10,974**	**10,706**	**10,442**	**10,163**	**9,857**	**9,553**
Projected Supply Surplus/Deficit			**1,088**	**-2,366**	**-6,184**	**-10,373**	**-15,124**	**-19,989**

Evaluation of Selected Water Management Strategies — Additional Supply by Decade

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	4,389	$ 1,336,274.94	$ 304.46	0	1089	1887	3861	4098	4389
Advanced Water Conservation Measures	1,425	$ 160,298.11	$ 112.47	144	357	595	854	1,136	1,425
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	15,600	$ 8,466,744.00	$ 542.74	0	1277	4297	6512	11,026	15600
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

144	2,723	6,779	11,227	16,260	21,414
1,231	356	595	854	1,136	1,425

WATER SUPPLY AND DEMAND ANALYSIS

County-Other: Cameron County

Year	Type		2010	2020	2030	2040	2050	2060
Total Population		38,872	45,090	51,663	58,457	65,231	72,006	78,449
Total Water Demand			6,970	7,812	8,709	9,572	10,485	11,424
Current Water Supply	**Type**							
AMISTAD/FALCON	Surface Water		13,090	13,078	13,068	13,059	13,052	13,047
OTHER LOCAL SUPPLY*	Surface Water		0	0	0	0	0	0
GULF COAST	Ground Water		2,519	2,478	2,439	2,396	2,354	2,311
GULF COAST	Ground Water		5	5	4	4	4	4
Total Supply (AF/yr)			**15,614**	**15,561**	**15,511**	**15,459**	**15,410**	**15,362**
Projected Supply Surplus/Deficit			**8,644**	**7,749**	**6,802**	**5,887**	**4,925**	**3,938**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	293	$ 32,907.91	$ 112.47		46	95	145	195	245	293
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Although there are water rights located on water courses in this basin other than the Rio Grande, these water rights are based to a large extent on irrigation return flows with poor water quality, therefore, the available supply has been set to zero.

46	95	145	195	245	293
8,690	7,844	6,946	6,082	5,170	4,230

WATER SUPPLY AND DEMAND ANALYSIS

CITY OF BROWNSVILLE

Year					2010	2020	2030	2040	2050	2060
Total Population				139722	173,986	210,210	247,653	284,979	322,316	357,828
Total Water Demand (ac-ft)					44,630	53,921	63,526	73,101	82,679	91,788
Advanced Water Conservation WMS (ac-ft)					974	1,884	3,051	3,831	4,694	5,211
Net Water Demand (ac-ft)					**43,656**	**52,037**	**60,475**	**69,270**	**77,985**	**86,577**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	865	29,285	MUNI		29,285	29,285	29,285	29,285	29,285	29,285
Groundwater-SRWA		7,800	GW		7,800	7,800	7,800	7,800	7,800	7,800
Total Supply (AF/yr)		**37,085**			**37,085**	**37,085**	**37,085**	**37,085**	**37,085**	**37,085**
Projected Supply Surplus/Deficit					**-6,570**	**-14,952**	**-23,389**	**-32,185**	**-40,900**	**-49,492**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	1,000	$ 304,460.00	$ 304.46		0	1000	1000	1000	1000	1000
Advanced Water Conservation Measures	1,612	$ 181,353.11	$ 112.47		253	521	798	1,074	1,350	1,612
Non-Potable Water Re-use	500	$ 207,610.00	$ 415.22		0	500	500	500	500	500
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	20,643	$ 11,090,864.61	$ 537.27		20,643	20,643	20,643	20,643	20,643	20,643
Acquisition of Water Rights:										
Purchase	1,793	$ 973,132.82	$ 542.74		0	0	0	0	0	1793
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	129	$ 58,767.24	$ 455.56		0	0	0	0	0	129
Desalination:										
Brackish Groundwater Desalination	16,802	$ 8,493,579.02	$ 505.51		8,401	8,401	8,401	8,401	16,802	16,802
Seawater Desalination	7,013	$ 5,383,389.19	$ 767.63		0	0	0	5,600	5,600	7,013
					29,297	31,065	31,342	37,218	45,895	49,492
					22,727	16,113	7,953	5,033	4,995	0

WATER SUPPLY AND DEMAND ANALYSIS

COMBES

					2010	2020	2030	2040	2050	2060
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				2553	3,089	3,655	4,240	4,823	5,407	5,962
Total Water Demand					225	266	309	351	394	434
Advanced Water Conservation WMS (ac-ft)					17	37	52	70	85	94
Net Water Demand (ac-ft)					**208**	**229**	**257**	**281**	**309**	**341**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	831	429.6	MUNI		430	430	430	430	430	430
Groundwater			GW							
Total Supply (AF/yr)		**429.6**			**430**	**430**	**430**	**430**	**430**	**430**
Projected Supply Surplus/Deficit					**222**	**200**	**173**	**149**	**120**	**89**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	25	$ 2,834.55	$ 112.47		4	8	12	17	21	25
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	25	$ 12,637.75	$ 505.51		0	25	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of Harlingen

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	226	234	210	191	166	139

WATER SUPPLY AND DEMAND ANALYSIS

E. RIO HONDO WSC

						2010	2020	2030	2040	2050	2060
Year											
Total Population					13741	13,741	19,904	26,420	33,155	39,869	46,585
Total Water Demand						2,519	3,344	4,197	5,046	5,897	6,705
Advanced Water Conservation WMS (ac-ft)						111	237	334	491	574	653
Net Water Demand (ac-ft)						**2,408**	**3,107**	**3,863**	**4,555**	**5,323**	**6,052**
Current Water Supply	**Water Right Number**	**Amount**	**Type**								
Amistad-Falcon Water Right/Contracts*	73, 284, 296, 838, 841, 625, 3269, 692	5,046	MUNI			5,046	5,046	5,046	5,046	5,046	5,046
Groundwater		0	GW								
Total Supply (AF/yr)		**5,046**				**5,046**	**5,046**	**5,046**	**5,046**	**5,046**	**5,046**
Projected Supply Surplus/Deficit						**2,639**	**1,939**	**1,184**	**492**	**-277**	**-1,006**

Evaluation of Selected Water Management Strategies

				Additional Supply by Decade					
Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	243	$ 27,309.48	$ 112.47	0	46	94	144	193	243
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	95	$ 51,560.30	$ 542.74	0	0	0	0	95	95
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	5	$ 2,277.80	$ 455.56	0	0	0	0	5	5
Desalination:									
Brackish Groundwater Desalination	906	$ 457,992.06	$ 505.51	100	100	100	100	177	906
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	2,739	2,085	1,377	735	194	243

WATER SUPPLY AND DEMAND ANALYSIS

EL JARDIN

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	8341	10,859	13,521	16,274	19,017	21,761	24,371
Total Water Demand		1,970	2,454	2,953	3,450	3,949	4,423
Advanced Water Conservation WMS (ac-ft)		61	121	182	234	293	328
Net Water Demand (ac-ft)		**1,909**	**2,333**	**2,771**	**3,216**	**3,656**	**4,095**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	843	1,600	MUNI						
Groundwater		0	GW						
Total Supply (AF/yr)		**1,600**		**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**
Projected Supply Surplus/Deficit				**-309**	**-733**	**-1,171**	**-1,616**	**-2,056**	**-2,495**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	119	$ 13,328.80	$ 112.47	19	38	59	79	99	119
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	2,370	$ 1,286,429.49	$ 542.74	294	696	1,112	1,535	1,953	2,370
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	125	$ 56,831.11	$ 455.56	15	37	59	81	103	125
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Brownsville Irrigation District

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	18	38	59	79	99	118

WATER SUPPLY AND DEMAND ANALYSIS

HARLINGEN

Year		2010	2020	2030	2040	2050	2060
Total Population	57564	66,805	76,575	86,674	96,741	106,811	116,389
Total Water Demand		11,674	13,381	15,146	16,905	18,664	20,338
Advanced Water Conservation WMS (ac-ft)		299	600	971	1,300	1,555	1,695
Net Water Demand (ac-ft)		**11,375**	**12,781**	**14,175**	**15,605**	**17,109**	**18,643**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts* Groundwater	223, 831, 840, 5254	16,621.0 0.0	MUNI GW	16,621	16,621	16,621	16,621	16,621	16,621
Total Supply (AF/yr)		**16,621.0**		16,621	16,621	16,621	16,621	16,621	16,621
Projected Supply Surplus/Deficit				**5,246**	**3,840**	**2,446**	**1,016**	**-488**	**-2,022**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	435	$ 48,912.44	$ 112.47	68	141	215	290	364	435
Non-Potable Water Re-use	50	$ 20,761.00	$ 415.22	0	0	0	0	50	50
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	50	$ 27,137.00	$ 542.74	0	0	0	0	50	50
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination*	1,922	$ 971,590.22	$ 505.51	0	25	25	25	388	1922
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Future Development of Desal. Plant or Wholesale Purchase

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	5,315	4,006	2,686	1,331	364	435

WATER SUPPLY AND DEMAND ANALYSIS

INDIAN LAKE

Year		2010	2020	2030	2040	2050	2060
Total Population	541	699	866	1,039	1,211	1,383	1,547
Total Water Demand		52	64	77	90	102	114
Advanced Water Conservation WMS (ac-ft)		3	7	10	14	17	19
Net Water Demand (ac-ft)		49	57	67	76	85	95

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts* Groundwater	various WRs	30.7	MUNI						
Total Supply (AF/yr)		30.7		31	31	31	31	31	31
Projected Supply Surplus/Deficit				-18	-27	-36	-46	-54	-64

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	7	$ 836.48	$ 112.47	1	2	4	5	6	7
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	64	$ 32,352.64	$ 505.51	18	27	36	46	54	64
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*supplied by ERHWSC

Surplus/Deficit after WMS's	1	3	4	5	6	7

WATER SUPPLY AND DEMAND ANALYSIS

LA FERIA

		2010	2020	2030	2040	2050	2060
Year							
Total Population	6115	7,954	9,898	11,908	13,912	15,916	17,822
Total Water Demand		909	1,131	1,361	1,590	1,818	2,036
Advanced Water Conservation WMS (ac-ft)		53	100	147	187	232	260
Net Water Demand (ac-ft)		**856**	**1,031**	**1,214**	**1,403**	**1,586**	**1,776**

Current Water Supply	**Water Right Number**	**Amount**	**Type**						
Amistad-Falcon Water Right/Contracts*	803	1,800.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**1,800.0**		**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**
Projected Supply Surplus/Deficit				**944**	**769**	**586**	**397**	**214**	**24**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	87	$ 9,734.26	$ 112.47		14	28	43	58	72	87
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	280	$ 141,542.80	$ 505.51		0	280	280	280	280	280
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* supplied by La Feria ID Cameron Cty No. 3
*Informed NRS through survey that they are looking into Brackish Desal. as a water supply

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	958	1,077	909	735	566	390

WATER SUPPLY AND DEMAND ANALYSIS

LAGUNA MADRE

		2010	2020	2030	2040	2050	2060
Year							
Total Population	4242	7,725	11,408	15,215	19,010	22,806	26,416
Total Water Demand		2,345	3,463	4,619	5,771	6,923	8,019
Advanced Water Conservation WMS (ac-ft)		35	77	102	149	179	207
Net Water Demand (ac-ft)		**2,310**	**3,386**	**4,517**	**5,622**	**6,744**	**7,812**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	850, 5127	7,480.4	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)*		7,480.4							
Contracts to Laguna Vista, South Padre, and Port Isabel**		3532							
Total Supply minus contracts		**3948**		**3,948**	**3,948**	**3,948**	**3,948**	**3,948**	**3,948**
Projected Supply Surplus/Deficit				**1,638**	**562**	**-568**	**-1,674**	**-2,796**	**-3,864**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	164	$ 18,437.48	$ 112.47		26	53	81	109	137	164
Non-Potable Water Re-use	50	$ 20,761.00	$ 415.22		50	50	50	50	50	50
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	900	$ 488,466.00	$ 542.74		0	0	48	188	425	900
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	50	$ 22,778.00	$ 455.56		0	0	2	12	25	50
Desalination:										
Brackish Groundwater Desalination	2,000	$ 1,011,020.00	$ 505.51		100	100	400	1000	1500	2,000
Seawater Desalination	864	$ 663,232.32	$ 767.63		100	100	118	424	796	864

***Projected supply for 2010-2060 excludes amounts supplied to Laguna Vista, Port Isabel, and South Padre**
****Based on amounts supplied in 2003**

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,914	865	131	110	137	164

WATER SUPPLY AND DEMAND ANALYSIS

LAGUNA VISTA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	1658	2,174	2,719	3,282	3,844	4,406	4,940
Total Water Demand		280	350	423	495	568	636
Advanced Water Conservation WMS (ac-ft)		12	27	40	52	64	72
Net Water Demand (ac-ft)		**268**	**323**	**383**	**443**	**504**	**564**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	850, 5127	1,022.0	MUNI						
Groundwater		0.0	GW						
		0.0							
Total Supply (AF/yr)**		**1,022.0**		**1,022**	**1,022**	**1,022**	**1,022**	**1,022**	**1,022**
Projected Supply Surplus/Deficit				**754**	**699**	**639**	**579**	**518**	**458**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	24	$ 2,728.95	$ 112.47		4	8	12	16	20	24
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	25	$ 19,190.75	$ 767.63		25	25	25	25	25	25

* Supplied by Laguna Madre WD water rights
** Supply based on amount of water supplied in 2003

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	783	732	676	620	563	507

WATER SUPPLY AND DEMAND ANALYSIS

LOS FRESNOS

Year		2010	2020	2030	2040	2050	2060
Total Population	4512	6,649	8,908	11,243	13,571	15,899	18,114
Total Water Demand		797	1,068	1,348	1,627	1,906	2,171
Advanced Water Conservation WMS (ac-ft)		12	27	40	52	64	72
Net Water Demand (ac-ft)		**785**	**1,041**	**1,308**	**1,575**	**1,842**	**2,099**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	853	911.7	MUNI						
Groundwater		190.0	GW						
Total Supply (AF/yr)		**1,101.7**		**1,102**	**1,102**	**1,102**	**1,102**	**1,102**	**1,102**
Projected Supply Surplus/Deficit				**317**	**61**	**-206**	**-474**	**-740**	**-997**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	101	$ 11,309.94	$ 112.47	16	32	50	67	84	101
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	997	$ 503,993.47	$ 505.51	0	0	206	474	740	997
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	333	94	50	67	84	100

WATER SUPPLY AND DEMAND ANALYSIS

LOS INDIOS

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	1149	1,418	1,703	1,997	2,290	2,583	2,862
Total Water Demand		238	286	336	385	434	481
Advanced Water Conservation WMS (ac-ft)		8	15	25	31	38	42
Net Water Demand (ac-ft)		**230**	**271**	**311**	**354**	**396**	**439**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*		0.0	MUNI						
Groundwater		230.0	GW						
Total Supply (AF/yr)**		**230.0**		**230**	**271**	**311**	**354**	**396**	**439**
Projected Supply Surplus/Deficit				**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	13	$ 1,424.34	$ 112.47	2	4	6	8	11	13
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by MHWSC
**Projected supply based on MHWSC meeting demand through 2060

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	2	4	6	8	10	12

WATER SUPPLY AND DEMAND ANALYSIS

MILITARY HIGHWAY WSC

					2010	2020	2030	2040	2050	2060
Year										
Total Population				8961	11,440	14,061	16,770	19,471	22,173	24,742
Total Water Demand					1,551	1,906	2,273	2,639	3,005	3,353
Advanced Water Conservation WMS (ac-ft)					64	126	207	262	323	360
Net Water Demand (ac-ft)					**1,487**	**1,780**	**2,066**	**2,377**	**2,682**	**2,993**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	284, 285, 286, 831	2,792.6	MUNI		1,396	1,396	1,396	1,396	1,396	1,396
Groundwater		2,891.0	GW		1,163	1,122	1,044	935	799	655
Supplied to Los Indios					230	271	311	354	396	439
Supplied to Progresso					576	717	867	1,037	1,234	1,436
Total Supply (AF/yr)		5,683.6								
Total Supply (AF/yr) less contracts*					**1,753**	**1,530**	**1,262**	**940**	**565**	**176**
Projected SupplySurplus/Deficit					**266**	**-250**	**-804**	**-1,437**	**-2,117**	**-2,817**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
				Additional Supply by Decade						
Additional Groundwater	1,250	$ 380,575.00	$ 304.46		0	250	500	750	1000	1250
Advanced Water Conservation Measures	117	$ 13,121.75	$ 112.47		18	38	58	78	98	117
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,489	$ 808,139.86	$ 542.74		0	0	289	653	1,061	1,489
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	78	$ 35,533.68	$ 455.56		0	0	15	34	56	78
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Available to meet customers other than Los Indios and Progresso

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	285	37	58	77	98	117

WATER SUPPLY AND DEMAND ANALYSIS

OLMITO WSC

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	4479	7,261	10,203	13,244	16,275	19,307	22,191
Total Water Demand		992	1,394	1,810	2,224	2,638	3,033
Advanced Water Conservation WMS (ac-ft)		41	80	119	164	195	224
Net Water Demand (ac-ft)		**951**	**1,314**	**1,691**	**2,060**	**2,443**	**2,809**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	854	·995.7	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**995.7**		**996**	**995**	**996**	**996**	**996**	**996**
Projected Supply Surplus/Deficit				**44**	**-319**	**-696**	**-1,064**	**-1,448**	**-1,814**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	131	$ 14,727.36	$ 112.47	21	42	65	87	110	131
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	1,723	$ 935,303.84	$ 542.74	0	303	661	1,011	1,376	1,723
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	91	$ 41,319.29	$ 455.56	0	16	35	53	72	91
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	65	42	65	87	110	131

WATER SUPPLY AND DEMAND ANALYSIS

PALM VALLEY

			2010	2020	2030	2040	2050	2060
Year			**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population		1298	1,402	1,512	1,625	1,738	1,851	1,959
Total Water Demand			421	454	488	522	556	588
Advanced Water Conservation WMS (ac-ft)			8	14	20	27	31	33
Net Water Demand (ac-ft)			**413**	**440**	**468**	**495**	**525**	**555**

Current Water Supply	Water Right Number	Amount	Type
Amistad-Falcon Water Right/Contracts *	809		MUNI
Groundwater			GW

	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**331**	**319**	**309**	**300**	**293**	**288**
Projected Supply Surplus/Deficit	**-82**	**-122**	**-159**	**-195**	**-232**	**-268**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	5	$ 549.62	$ 112.47	1	2	2	3	4	5
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	255	$ 138,181.60	$ 542.74	78	116	151	185	220	255
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	13	$ 6,104.50	$ 455.56	4	6	8	10	12	13
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Palm Valley UD and Harlingen ID water right

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1	2	2	4	4	5

WATER SUPPLY AND DEMAND ANALYSIS

PALM VALLEY ESTATES UD

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	250	344	444	547	650	753	851
Total Water Demand		86	111	137	163	189	214
Advanced Water Conservation WMS (ac-ft)		2	3	6	8	9	10
Net Water Demand (ac-ft)		**84**	**108**	**131**	**155**	**180**	**204**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	831	100.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**100.0**		**81**	**94**	**104**	**112**	**119**	**125**
Projected Supply Surplus/Deficit				**-3**	**-14**	**-28**	**-43**	**-60**	**-79**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	4	$ 499.73	$ 112.47		1	1	2	3	4	4
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	75	$ 40,705.50	$ 542.74		3	12	27	41	57	75
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	4	$ 1,822.24	$ 455.56		0	2	1	2	3	4
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied by Harlingen ID water right

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1	2	3	3	3	5

WATER SUPPLY AND DEMAND ANALYSIS

PORT ISABEL

Year		2010	2020	2030	2040	2050	2060
Total Population	4865	5,282	5,723	6,179	6,633	7,088	7,520
Total Water Demand		2,668	2,891	3,122	3,351	3,581	3,799
Advanced Water Conservation WMS (ac-ft)		24	45	69	97	111	118
Net Water Demand (ac-ft)		**2,644**	**2,846**	**3,053**	**3,254**	**3,470**	**3,681**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	850	756.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)**		**756.0**		**756**	**756**	**756**	**756**	**756**	**756**
Projected Supply Surplus/Deficit				**-1,888**	**-2,090**	**-2,297**	**-2,498**	**-2,714**	**-2,925**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	20	$ 2,207.61	$ 112.47		3	6	10	13	16	20
Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1,389	$ 753,811.59	$ 542.74		897	993	1,091	1,187	1,289	1,389
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	73	$ 33,301.44	$ 455.56		47	52	57	62	68	73
Desalination:										
Brackish Groundwater Desalination	1,463	$ 739,561.13	$ 505.51		944	1045	1149	1249	1357	1463
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied by Laguna Madre WD water rights
** Supply based on amount of water supplied in 2003

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	3	6	10	13	17	20

WATER SUPPLY AND DEMAND ANALYSIS

PRIMERA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	2723	3,449	4,217	5,011	5,802	6,593	7,346
Total Water Demand		549	671	797	923	1,049	1,168
Advanced Water Conservation WMS (ac-ft)		23	43	67	84	103	115
Net Water Demand (ac-ft)		**526**	**628**	**730**	**839**	**946**	**1,053**

Current Water Supply	**Water Right Number**	**Amount**	**Type**	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	855, 831	584.0	MUNI	584	584	584	584	584	584
Groundwater		0.0	GW						
Total Supply (AF/yr)		**584.0**		**584**	**584**	**584**	**584**	**584**	**584**
Projected Supply Surplus/Deficit				**58**	**-44**	**-146**	**-255**	**-362**	**-469**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	**Yield (AF/yr)**	**Total Annual Cost**	**Unit Cost ($)**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	34	$ 3,843.98	$ 112.47	5	11	17	23	29	34
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	422	$ 228,927.73	$ 542.74	0	18	115	219	320	422
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	22	$ 10,113.43	$ 455.56	0	1	6	12	17	22
Desalination:									
Brackish Groundwater Desalination	25	$ 12,637.75	$ 505.51	0	25	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*City of Primera water right, and Harlingen ID contract

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	64	11	17	23	29	34

WATER SUPPLY AND DEMAND ANALYSIS

RANCHO VIEJO

						2010	2020	2030	2040	2050	2060
Year						**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population					1754	2,665	3,628	4,623	5,615	6,607	7,551
Total Water Demand						385	524	668	811	955	1,091
Advanced Water Conservation WMS (ac-ft)						12	28	41	57	67	76
Net Water Demand (ac-ft)						**373**	**496**	**627**	**754**	**888**	**1,015**
Current Water Supply	**Water Right Number**	**Amount**	**Type**								
Amistad-Falcon Water Right/Contracts*	202	See Valley MUD #2	MUNI			827	827	827	827	827	827
Groundwater: SRWA + VMUD2 Contracts			GW			355	355	355	355	355	355
Total Supply (AF/yr)						**1,182**	**1,182**	**1,182**	**1,182**	**1,182**	**1,182**
Projected Supply Surplus/Deficit**						**809**	**686**	**555**	**427**	**293**	**167**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	43	$ 4,820.15	$ 112.47	7	14	21	29	36	43
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

* Supplied Valley MUD #2 water right
**Surplus/Deficit based on Valley MUD supplying demand through 2060

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	815	700	576	456	329	210

WATER SUPPLY AND DEMAND ANALYSIS

RIO HONDO

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	1942	2,098	2,263	2,434	2,604	2,774	2,936
Total Water Demand		416	449	483	516	550	582
Advanced Water Conservation WMS (ac-ft)		12	20	30	41	47	49
Net Water Demand (ac-ft)		**404**	**429**	**453**	**475**	**503**	**533**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	841	890.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**890.0**		**890**	**890**	**890**	**890**	**890**	**890**
Projected Supply Surplus/Deficit				**486**	**461**	**437**	**415**	**387**	**357**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	7	$ 826.50	$ 112.47	1	2	4	5	6	7
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	200	200	200	200	200	200
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	687	664	641	620	593	565

WATER SUPPLY AND DEMAND ANALYSIS

SAN BENITO

Year		2010	2020	2030	2040	2050	2060
Total Population	23444	26,922	30,599	34,400	38,189	41,979	45,584
Total Water Demand		5,036	5,724	6,435	7,144	7,853	8,527
Advanced Water Conservation WMS (ac-ft)		121	240	385	513	611	664
Net Water Demand (ac-ft)		**4,915**	**5,484**	**6,050**	**6,631**	**7,242**	**7,863**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	841	7,032.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**7,032.0**		**7,032**	**7,032**	**7,032**	**7,032**	**7,032**	**7,032**
Projected Supply Surplus/Deficit				**2,117**	**1,548**	**982**	**401**	**-210**	**-831**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	164	$ 18,409.20	$ 112.47	26	53	81	109	137	164
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	789	$ 428,466.09	$ 542.74	0	0	0	0	199.5	789.45
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	42	$ 18,928.52	$ 455.56	0	0	0	0	10.5	41.55
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Cameron County ID #2

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	2,142	1,601	1,063	510	137	163

WATER SUPPLY AND DEMAND ANALYSIS

SANTA ROSA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	2833	3,472	4,148	4,847	5,543	6,240	6,903
Total Water Demand		350	418	489	559	629	696
Advanced Water Conservation WMS (ac-ft)		19	42	60	81	98	108
Net Water Demand (ac-ft)		**331**	**376**	**429**	**478**	**531**	**588**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	803	900.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**900.0**		**900**	**900**	**900**	**900**	**900**	**900**
Projected Supply Surplus/Deficit				**569**	**524**	**471**	**422**	**369**	**312**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	30	$ 3,384.17	$ 112.47	5	10	15	20	25	30
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied through LaFeria, Cameron County ID #2

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	574	534	486	442	394	342

WATER SUPPLY AND DEMAND ANALYSIS

SOUTH PADRE ISLAND

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	2422	3,203	4,028	4,881	5,732	6,583	7,392
Total Water Demand		2,526	3,176	3,849	4,520	5,191	5,829
Advanced Water Conservation WMS (ac-ft)		22	41	60	77	96	108
Net Water Demand (ac-ft)		**2,504**	**3,135**	**3,789**	**4,443**	**5,095**	**5,721**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	850	1,754.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**1,754.0**		**1,754**	**1,754**	**1,754**	**1,754**	**1,754**	**1,754**
Projected Supply Surplus/Deficit				**-750**	**-1,381**	**-2,035**	**-2,689**	**-3,341**	**-3,967**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	37	$ 4,132.51	$ 112.47		6	12	18	24	31	37
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	3,769	$ 2,045,397.10	$ 542.74		713	1,312	1,933	2,555	3,174	3,769
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	198	$ 90,360.33	$ 455.56		38	69	102	134	167	198
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

* Supplied by Laguna Madre WD water rights
** Supply based on amount of water supplied in 2003

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	5	11	18	25	31	36

WATER SUPPLY AND DEMAND ANALYSIS

VALLEY MUD #2

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	1246	1,246	1,246	1,246	1,246	1,246	1,246
Total Water Demand		863	863	863	863	863	863
Advanced Water Conservation WMS (ac-ft)		4	8	13	17	20	20
Net Water Demand (ac-ft)		**859**	**855**	**850**	**846**	**843**	**843**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	own WR		MUNI	656	162	150	138	125	113
Groundwater: SRWA + VMUD2			GW	353	310	264	219	173	128
Total Supply (AF/yr)				**1,009**	**472**	**414**	**357**	**298**	**242**
Projected Supply Surplus/Deficit				**150**	**-383**	**-437**	**-489**	**-546**	**-602**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	316	$ 171,695.80	$ 542.74	0	113	160	209	263	316
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	17	$ 7,585.07	$ 455.56	0	6	8	11	14	17
Desalination:									
Brackish Groundwater Desalination	269	$ 135,982.19	$ 505.51	0	268	269	269	269	269
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	150	4	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

ALAMO

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	14760	20,915	28,107	36,163	44,880	54,400	64,166
Total Water Demand		2,413	3,243	4,172	5,178	6,276	7,403
Advanced Water Conservation WMS (ac-ft)		94	220	365	503	609	719
Net Water Demand (ac-ft)		**2,319**	**3,023**	**3,807**	**4,675**	**5,667**	**6,684**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	808	1,804.3	MUNI	1,804	1,804	1,804	1,804	1,804	1,804
Groundwater		450.0	GW	450	450	450	450	450	450
Total Supply (AF/yr)		**2,254.3**		**2,254**	**2,254**	**2,254**	**2,254**	**2,254**	**2,254**
Projected Supply Surplus/Deficit				**-65**	**-768**	**-1,553**	**-2,421**	**-3,412**	**-4,430**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	100	$ 30,446.00	$ 304.46		0	100	100	100	100	100
Advanced Water Conservation Measures	365	$ 41,080.63	$ 112.47		46	99	158	223	293	365
Non-Potable Water Re-use	500	$ 207,610.00	$ 415.22		25	100	200	300	400	500
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	451	$ 244,775.74	$ 542.74		13	90	180	271	361	451
Urbanization	2,100	$ 773,577.00	$ 368.37		25	400	800	1,300	1,700	2,100
Contract		$ -	$ 455.56		2	5	10	14	19	24
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	1,255	$ 634,415.05	$ 505.51		0	73	263	436	832	1255
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Hidalgo County ID #2
*Current Policy of HCID#2 is to transfer water rights when land is excluded from the district at no charge.

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	46	98	158	223	293	365

WATER SUPPLY AND DEMAND ANALYSIS

ALTON

Year					2010	2020	2030	2040	2050	2060
Total Population				4384	12,342	15,513	19,064	22,907	27,104	31,411
Total Water Demand					3,401	4,275	5,253	6,312	7,469	8,655
Advanced Water Conservation WMS (ac-ft)					55	122	192	257	334	387
Net Water Demand (ac-ft)					**55**	**122**	**192**	**257**	**334**	**387**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts *	809	3,346.0	MUNI		3,346	4,153	2,615	2,637	2,653	2,666
Groundwater		0.0	GW							
Total Supply (AF/yr)		**3,346.0**			**3,346**	**4,153**	**2,615**	**2,637**	**2,653**	**2,666**
Projected Supply Surplus/Deficit					**3,291**	**4,031**	**2,423**	**2,380**	**2,319**	**2,279**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	200	$ 22,472.70	$ 112.47		59	82	109	137	168	200
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Sharyland WSC

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	3,350	4,114	2,532	2,517	2,487	2,479

WATER SUPPLY AND DEMAND ANALYSIS

DONNA

Year		2010	2020	2030	2040	2050	2060
Total Population	14768	16,757	19,080	21,682	24,498	27,574	30,729
Total Water Demand		2,384	2,714	3,084	3,485	3,923	4,371
Advanced Water Conservation WMS (ac-ft)		75	150	243	329	402	447
Net Water Demand (ac-ft)		**2,309**	**2,564**	**2,841**	**3,156**	**3,521**	**3,924**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	805	4,190.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**4,190.0**		**4,190**	**4,190**	**4,190**	**4,190**	**4,190**	**4,190**
Projected Supply Surplus/Deficit				**1,881**	**1,626**	**1,349**	**1,034**	**669**	**266**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	25	$ 7,611.50	$ 304.46		0	25	25	25	25	25
Advanced Water Conservation Measures	118	$ 13,271.42	$ 112.47		15	32	51	72	95	118
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	50	$ 25,275.50	$ 505.51		0	50	50	50	50	50
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Planned to interconnect with NAWSC's Brackish Desalination Plant

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,896	1,732	1,475	1,181	838	459

WATER SUPPLY AND DEMAND ANALYSIS

EDCOUCH

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	3342	3,778	4,287	4,858	5,475	6,149	6,841
Total Water Demand		521	591	669	754	847	943
Advanced Water Conservation WMS (ac-ft)		21	43	65	86	103	115
Net Water Demand (ac-ft)		**500**	**548**	**604**	**668**	**744**	**828**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	812	1,340.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**1,340.0**		**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**
Projected Supply Surplus/Deficit				**840**	**792**	**736**	**672**	**596**	**512**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	26	$ 2,909.39	$ 112.47	3	7	11	16	21	26
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Hidalgo County ID #9

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	843	799	748	688	617	538

WATER SUPPLY AND DEMAND ANALYSIS

EDINBURG

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	48465	64,792	83,869	105,237	128,358	153,611	179,517
Total Water Demand		8,637	11,179	14,028	17,110	20,476	23,929
Advanced Water Conservation WMS (ac-ft)		363	752	1,061	1,582	1,893	2,212
Net Water Demand (ac-ft)		**8,274**	**10,427**	**12,967**	**15,528**	**18,583**	**21,717**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	801, 816	10,725.0	MUNI	10,225	10225	10225	10225	10225	10225
Groundwater		500.0	GW	500	500	500	500	500	500
Total Supply (AF/yr)		**11,225.0**		**10,725**	**10,725**	**10,725**	**10,725**	**10,725**	**10,725**
Projected Supply Surplus/Deficit				**2,451**	**298**	**-2,242**	**-4,803**	**-7,858**	**-10,992**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	969	$ 108,968.52	$ 112.47	121	262	420	591	777	969
Non-Potable Water Re-use	4,000	$ 1,660,880.00	$ 415.22	0	0	500	1,500	3,000	4,000
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	6,619	$ 3,592,206.10	$ 542.74	0	0	1,631	3,114	4,591	6,619
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	348	$ 158,694.33	$ 455.56	0	0	86	164	242	348
Desalination:									
Brackish Groundwater Desalination	25	$ 12,637.75	$ 505.51	0	0	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by HCID #1

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	2,572	559	420	590	777	969

WATER SUPPLY AND DEMAND ANALYSIS

ELSA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	5549	5,838	6,175	6,553	6,962	7,408	7,866
Total Water Demand		1,118	1,183	1,255	1,334	1,419	1,507
Advanced Water Conservation WMS (ac-ft)		20	48	73	101	116	123
Net Water Demand (ac-ft)		**1,098**	**1,135**	**1,182**	**1,233**	**1,303**	**1,384**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	812	1,840.0	MUNI						
Groundwater		0.0	GW						
Contracts									
Total Supply (AF/yr)		**1,840.0**		**1,840**	**1,840**	**1,840**	**1,840**	**1,840**	**1,840**
Projected Supply Surplus/Deficit				**742**	**705**	**658**	**607**	**537**	**456**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	17	$ 1,926.56	$ 112.47	2	5	7	10	14	17
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	50	$ 27,137.00	$ 542.74	0	0	0	0	50	50
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	100	$ 50,551.00	$ 505.51	0	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by HCCID #9

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	744	810	766	718	701	623

WATER SUPPLY AND DEMAND ANALYSIS

HIDALGO

Year		2010	2020	2030	2040	2050	2060
Total Population	7322	11,109	15,534	20,491	25,854	31,711	37,720
Total Water Demand		1,108	1,549	2,043	2,578	3,162	3,760
Advanced Water Conservation WMS (ac-ft)		50	104	184	261	320	380
Net Water Demand (ac-ft)		**1,058**	**1,445**	**1,859**	**2,317**	**2,842**	**3,380**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	857	12.5	MUNI	13	13	13	13	13	13
Groundwater		826.0	GW	1,693	1,693	1,693	1,693	1,693	1,693
Total Supply (AF/yr)		**838.5**		**1,706**	**1,706**	**1,706**	**1,706**	**1,706**	**1,706**
Projected Supply Surplus/Deficit				**647**	**261**	**-154**	**-612**	**-1,137**	**-1,674**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	650	$ 197,899.00	$ 304.46	110	250	350	450	550	650
Advanced Water Conservation Measures	225	$ 25,275.65	$ 112.47	28	61	97	137	180	225
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	973	$ 528,086.02	$ 542.74	0	0	0	154	558	973
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	51	$ 23,233.56	$ 455.56	0	0	0	8	29	51
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	785	572	293	137	180	225

WATER SUPPLY AND DEMAND ANALYSIS

HIDALGO COUNTY MUD #1

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	3400	5,280	7,476	9,936	12,598	15,505	18,487
Total Water Demand		1,733	2,454	3,261	4,135	5,089	6,067
Advanced Water Conservation WMS (ac-ft)		30	67	100	141	174	207
Net Water Demand (ac-ft)		**1,703**	**2,387**	**3,161**	**3,994**	**4,915**	**5,860**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	543	384.0	MUNI						
Groundwater		0.0	GW						
Contracts									
Total Supply (AF/yr)		**384.0**		**384**	**384**	**384**	**384**	**384**	**384**
Projected Supply Surplus/Deficit				**-1,319**	**-2,003**	**-2,777**	**-3,610**	**-4,531**	**-5,476**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	112	$ 12,544.70	$ 112.47	14	30	48	68	89	112
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	5,202	$ 2,823,442.03	$ 542.74	1,253	1,903	2,638	3,430	4,304	5,202
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	274	$ 124,732.33	$ 455.56	66	100	139	181	227	274
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	13	30	48	68	89	112

WATER SUPPLY AND DEMAND ANALYSIS

LA JOYA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	3303	3,960	4,727	5,587	6,518	7,534	8,576
Total Water Demand		430	514	607	709	818	932
Advanced Water Conservation WMS (ac-ft)		22	42	69	95	118	134
Net Water Demand (ac-ft)		**408**	**472**	**538**	**614**	**700**	**798**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	864, 802	512.5	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**512.5**		**513**	**513**	**513**	**513**	**513**	**513**
Projected Supply Surplus/Deficit				**105**	**41**	**-26**	**-102**	**-187**	**-285**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	39	$ 4,384.45	$ 112.47	5	11	17	24	31	39
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	185	$ 68,148.45	$ 368.37	0	0	0	2	87	185
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	100	$ 50,551.00	$ 505.51	50	50	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Village of LaJoya water right and HCID #16 water right

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	160	101	91	24	31	39

WATER SUPPLY AND DEMAND ANALYSIS

LA VILLA

Year		2010	2020	2030	2040	2050	2060
Total Population	1305	1,305	1,305	1,305	1,305	1,305	1,305
Total Water Demand		240	240	240	240	240	240
Advanced Water Conservation WMS (ac-ft)		6	10	15	19	22	22
Net Water Demand (ac-ft)		**234**	**230**	**225**	**221**	**218**	**218**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	812	500.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**500.0**		**500**	**500**	**500**	**500**	**500**	**500**
Projected Supply Surplus/Deficit				**266**	**270**	**275**	**279**	**282**	**282**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by HCCID #9

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	266	270	275	279	282	282

WATER SUPPLY AND DEMAND ANALYSIS

MCALLEN

Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				106414	127,458	152,045	179,586	209,386	241,933	275,322
Total Water Demand					29,268	34,914	41,239	48,081	55,555	63,222
Advanced Water Conservation WMS (ac-ft)					571	1,363	2,012	2,815	3,523	4,009
Net Water Demand (ac-ft)					**28,697**	**33,552**	**39,227**	**45,266**	**52,032**	**59,213**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	343, 846, 848, 808	33,548.8	MUNI		32,429	32,429	32,429	32,429	32,429	32,429
Groundwater		0.0	GW							
Contract to Edinburg		1,120.0								
Total Supply (AF/yr)		**32,428.8**			**32,429**	**32,429**	**32,429**	**32,429**	**32,429**	**32,429**
Projected Supply Surplus/Deficit					**3,732**	**-1,123**	**-6,799**	**-12,838**	**-19,603**	**-26,784**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	1,450	$ 441,467.00	$ 304.46	0	0	352	588	875	1,450
Advanced Water Conservation Measures	1,249	$ 140,445.43	$ 112.47	156	337	541	761	1,002	1,249
Non-Potable Water Re-use	9,893	$ 4,107,771.46	$ 415.22	0	0	0	2,349	5,287	9,893
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	7,220	$ 3,918,582.80	$ 542.74	0	0	727	4,085	5,320	7,220
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	380	$ 173,112.80	$ 455.56	0	0	120	215	280	380
Desalination:									
Brackish Groundwater Desalination	7,841	$ 3,963,703.91	$ 505.51	3,360	3360	5600	5600	7841	7841
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	7,248	2,575	541	761	1,002	1,249

WATER SUPPLY AND DEMAND ANALYSIS

MERCEDES

					2010	2020	2030	2040	2050	2060
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				13649	14,546	15,595	16,770	18,041	19,429	20,853
Total Water Demand					1,955	2,096	2,254	2,425	2,612	2,803
Advanced Water Conservation WMS (ac-ft)					65	140	207	283	326	350
Net Water Demand (ac-ft)					**1,890**	**1,956**	**2,047**	**2,142**	**2,286**	**2,453**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	823, 812	3,595.0	MUNI		3,595	3,595	3,595	3,595	3,595	3,595
Groundwater		1,691.0	GW		1,691	1,691	1,691	1,691	1,691	1,691
Total Supply (AF/yr)		**5,286.0**			**5,286**	**5,286**	**5,286**	**5,286**	**5,286**	**5,286**
Projected Supply Surplus/Deficit					**3,396**	**3,330**	**3,239**	**3,144**	**3,000**	**2,833**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	560	$ 170,497.60	$ 304.46		0	560	560	560	560	560
Advanced Water Conservation Measures	53	$ 5,990.06	$ 112.47		7	14	23	32	43	53
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	560	$ 283,085.60	$ 505.51		560	560	560	560	560	560
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	3,963	4,464	4,382	4,296	4,163	4,007

WATER SUPPLY AND DEMAND ANALYSIS

MISSION

Year		2010	2020	2030	2040	2050	2060
Total Population	45408	61,154	79,551	100,157	122,454	146,807	171,790
Total Water Demand		10,207	13,277	16,716	20,438	24,502	28,672
Advanced Water Conservation WMS (ac-ft)		343	713	1,122	1,646	1,973	2,309
Net Water Demand (ac-ft)		**9,864**	**12,564**	**15,594**	**18,792**	**22,529**	**26,363**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	806, 828, 849, 846	9,594.5	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**9,594.5**		**9,595**	**9,595**	**9,595**	**9,595**	**9,595**	**9,595**
Projected Supply Surplus/Deficit				**-270**	**-2,970**	**-6,000**	**-9,197**	**-12,934**	**-16,768**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	934	$ 105,085.46	$ 112.47	116	252	405	570	750	934
Non-Potable Water Re-use	4,548	$ 1,888,420.56	$ 415.22	140	310	1,400	2,437	3,474	4,548
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	11,660	$ 4,295,194.20	$ 368.37	130	2,100	4,040	6,200	8,900	11,660
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	560	$ 283,085.60	$ 505.51	0	560	560	560	560	560
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*City of Mission and United ID

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	116	253	405	569	750	934

WATER SUPPLY AND DEMAND ANALYSIS

NORTH ALAMO WSC (Hidalgo County)

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	80960	114,538	153,770	197,713	245,263	297,197	350,473
Total Water Demand		12,317	16,535	21,261	26,374	31,959	37,688
Advanced Water Conservation WMS (ac-ft)		642	1,378	2,215	3,022	3,662	4,318
Net Water Demand (ac-ft)		**11,676**	**15,157**	**19,046**	**23,352**	**28,297**	**33,370**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	240, 461, 804, 805, 808, 808, 816		MUNI	19,400	19519.6	19626.7	19728.5	19831.3	19927.2
Groundwater			GW	1,258	1,265	1,272	1,279	1,286	1,292
Contracts									
Total Supply (AF/yr)				**20,658**	**20,785**	**20,899**	**21,007**	**21,117**	**21,219**
Projected Supply Surplus/Deficit*				**8,982**	**5,628**	**1,853**	**-2,345**	**-7,180**	**-12,151**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	1,993	$ 224,097.56	$ 112.47		248	538	863	1,215	1,599	1,993
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	902	$ 489,551.48	$ 542.74		0	0	0	0	0	902
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	48	$ 21,866.88	$ 455.56		0	0	0	0	0	48
Desalination:										
Brackish Groundwater Desalination	11,201	$ 5,662,217.51	$ 505.51		11,201	11201	11201	11201	11201	11201
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Based on water supply available for Hidalgo Cty only

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	20,431	17,367	13,917	10,071	5,619	1,993

WATER SUPPLY AND DEMAND ANALYSIS

PALMHURST

Year		2010	2020	2030	2040	2050	2060
Total Population	4872	9,144	14,136	19,727	25,777	32,384	39,162
Total Water Demand		1,168	1,805	2,519	3,292	4,135	5,001
Advanced Water Conservation WMS (ac-ft)		11	16	22	29	36	44
Net Water Demand (ac-ft)		**1,157**	**1,789**	**2,497**	**3,263**	**4,099**	**4,957**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *		1,157.0	MUNI						
Groundwater		0.0	GW						
Contracts									
Total Supply (AF/yr)				**1,157**	**1,789**	**2,706**	**2,967**	**3,170**	**3,324**
Projected Supply Surplus/Deficit				**0**	**0**	**209**	**-296**	**-929**	**-1,633**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	254	$ 28,511.82	$ 112.47	32	68	110	155	203	254
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	1,551	$ 841,979.70	$ 542.74	0	0	0	281	883	1,551
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	82	$ 37,196.47	$ 455.56	0	0	0	15	46	82
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Sharyland WSC

Surplus/Deficit after WMS's	32	68	319	154	204	253

WATER SUPPLY AND DEMAND ANALYSIS

PALMVIEW

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	4107	6,258	8,771	11,586	14,632	17,959	21,372
Total Water Demand		897	1,258	1,661	2,098	2,575	3,064
Advanced Water Conservation WMS (ac-ft)		28	59	91	131	161	192
Net Water Demand (ac-ft)		**869**	**1,199**	**1,570**	**1,967**	**2,414**	**2,872**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*		869.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)**		**869.0**		**869**	**1,199**	**1,570**	**1,967**	**1,967**	**1,967**
Projected Supply Surplus/Deficit				**0**	**0**	**0**	**0**	**-447**	**-905**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	128	$ 14,355.69	$ 112.47	16	34	55	78	102	128
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	860	$ 466,756.40	$ 542.74	0	0	0	0	425	860
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	45	$ 20,636.87	$ 455.56	0	0	0	0	22	45
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by LaJoya WSC
**Total supply based on LaJoya WSC's water supply

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	16	34	55	78	102	127

WATER SUPPLY AND DEMAND ANALYSIS

PENITAS

Year		2010	2020	2030	2040	2050	2060
Total Population	1167	1,201	1,241	1,285	1,333	1,385	1,439
Total Water Demand		153	158	164	170	177	184
Advanced Water Conservation WMS (ac-ft)		4	8	14	19	22	23
Net Water Demand (ac-ft)		**149**	**150**	**150**	**151**	**155**	**161**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	860, Various	162.5	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**162.5**		**162**	**163**	**163**	**164**	**164**	**164**
Projected Supply Surplus/Deficit				**13**	**13**	**13**	**13**	**9**	**3**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	2	$ 226.17	$ 112.47	0	1	1	1	2	2
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	13	14	14	15	10	5

WATER SUPPLY AND DEMAND ANALYSIS

PHARR

Year		2010	2020	2030	2040	2050	2060
Total Population	46660	59,571	74,656	91,553	109,836	129,805	150,291
Total Water Demand		8,808	11,039	13,537	16,240	19,193	22,222
Advanced Water Conservation WMS (ac-ft)		334	669	1,026	1,353	1,745	2,020
Net Water Demand (ac-ft)		**8,474**	**10,370**	**12,511**	**14,887**	**17,448**	**20,202**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	808, 874	8,591.0	MUNI						
Groundwater		1,190.0	GW						
Contracts									
Total Supply (AF/yr)		**9,781.0**		**9,781**	**9,781**	**9,781**	**9,781**	**9,781**	**9,781**
Projected Supply Surplus/Deficit				**1,307**	**-589**	**-2,730**	**-5,106**	**-7,667**	**-10,421**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	100	$ 30,446.00	$ 304.46	100	100	100	100	100	100
Advanced Water Conservation Measures	766	$ 86,168.21	$ 112.47	95	207	332	467	615	766
Non-Potable Water Re-use	50	$ 20,761.00	$ 415.22	50	50	50	50	50	50
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	8,522	$ 4,625,474.51	$ 542.74	0	345.8	1976	3948.2	6286.15	8522.45
Urbanization	1,300	$ 478,881.00	$ 368.37	0	75	500	800	900	1,300
Contract	449	$ 204,341.44	$ 455.56	0	18.2	104	207.8	330.85	448.55
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,552	207	331	467	614	766

WATER SUPPLY AND DEMAND ANALYSIS

PROGRESSO

Year		2010	2020	2030	2040	2050	2060
Total Population	4851	6,348	8,097	10,056	12,176	14,491	16,866
Total Water Demand		597	762	946	1,146	1,363	1,587
Advanced Water Conservation WMS (ac-ft)		21	45	79	109	130	151
Net Water Demand (ac-ft)		**576**	**717**	**867**	**1,037**	**1,233**	**1,436**

Current Water Supply	Water Right Number	Amount	Type
Amistad-Falcon Water Right/Contracts*		All supply is GW from MHWSC	MUNI
Groundwater	576		GW

	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)**	**576**	**717**	**867**	**1,037**	**1,234**	**1,436**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**1**	**0**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	89	$ 9,990.36	$ 112.47	11	24	38	54	71	89
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by MHWSC
**Total Supply based on meeting demands through 2060

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	11	24	38	54	72	89

WATER SUPPLY AND DEMAND ANALYSIS

SAN JUAN

Year		2010	2020	2030	2040	2050	2060
Total Population	26229	39,074	54,082	70,892	89,081	108,947	129,327
Total Water Demand		3,720	5,149	6,750	8,482	10,373	12,314
Advanced Water Conservation WMS (ac-ft)		219	485	794	1,098	1,342	1,594
Net Water Demand (ac-ft)		**3,501**	**4,664**	**5,956**	**7,384**	**9,031**	**10,720**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	808, 873	3,023.3	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**3,023.3**		**3,023**	**3,023**	**3,023**	**3,023**	**3,023**	**3,023**
Projected Supply Surplus/Deficit				**-478**	**-1,641**	**-2,933**	**-4,361**	**-6,007**	**-7,697**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	762	$ 85,725.03	$ 112.47	95	206	330	465	612	762
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	7,312	$ 3,968,596.29	$ 542.74	454	1,560	2,786	4,143	5,708	7,312
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	385	$ 175,322.27	$ 455.56	24	82	147	218	300	385
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*City of San Juan and HID #2 water rights

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	95	207	331	465	612	762

WATER SUPPLY AND DEMAND ANALYSIS

SHARYLAND WSC

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	27988	31,885	36,438	41,538	47,057	53,085	59,268
Total Water Demand		5,036	5,755	6,561	7,432	8,384	9,361
Advanced Water Conservation WMS (ac-ft)		143	286	465	685	892	996
Net Water Demand (ac-ft)		**4,893**	**5,469**	**6,096**	**6,747**	**7,492**	**8,365**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	809, 816, 846	12,139.6	MUNI						
Groundwater		0.0	GW						
Contract to Edinburg, Palmhurst, Alton		5,623.0							
Total Supply (AF/yr)		**6,516.6**		**6,517**	**5,078**	**5,698**	**5,416**	**5,196**	**5,030**
Projected Supply Surplus/Deficit				**1,624**	**-392**	**-397**	**-1,331**	**-2,296**	**-3,335**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	231	$ 26,009.03	$ 112.47		29	62	100	141	186	231
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	3,168	$ 1,719,536.01	$ 542.74		0	372.4	377.15	1264.45	2181.2	3168.25
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	167	$ 75,964.63	$ 455.56		0	19.6	19.85	66.55	114.8	166.75
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,652	63	100	141	186	231

WATER SUPPLY AND DEMAND ANALYSIS

SULLIVAN CITY

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	3998	5,528	7,315	9,317	11,483	13,849	16,276
Total Water Demand		557	737	939	1,158	1,396	1,641
Advanced Water Conservation WMS (ac-ft)		31	66	94	141	171	201
Net Water Demand (ac-ft)		**526**	**671**	**845**	**1,017**	**1,225**	**1,440**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	859, 521	685.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**685.0**		**685**	**858**	**1,029**	**1,029**	**1,029**	**1,029**
Projected Supply Surplus/Deficit				**159**	**187**	**184**	**12**	**-196**	**-411**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	91	$ 10,209.04	$ 112.47	11	25	39	55	73	91
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	390	$ 211,668.60	$ 542.74	0	0	0	0	186	390
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	21	$ 9,566.76	$ 455.56	0	0	0	0	10	21
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by LaJoya WSC

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	170	211	223	68	72	90

WATER SUPPLY AND DEMAND ANALYSIS

WESLACO

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	26935	30,878	35,485	40,645	46,229	52,328	58,584
Total Water Demand		5,707	6,558	7,512	8,544	9,671	10,828
Advanced Water Conservation WMS (ac-ft)		173	358	546	725	879	984
Net Water Demand (ac-ft)		**5,534**	**6,200**	**6,966**	**7,819**	**8,792**	**9,844**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	812, 824	8,576.2	MUNI						
Groundwater		0.0	GW						
Contract to NAWSC, MHWSC		495.0							
Total Supply (AF/yr)		**8,081.2**		**8,081**	**8,081**	**8,081**	**8,081**	**8,081**	**8,081**
Projected Supply Surplus/Deficit				**2,547**	**1,881**	**1,116**	**262**	**-711**	**-1,762**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	500	$ 152,230.00	$ 304.46	0	0	0	0	0	500
Advanced Water Conservation Measures	234	$ 26,315.85	$ 112.47	29	63	101	143	188	234
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	1,120	$ 790,596.80	$ 705.89	1,120	1120	1120	1120	1120	1120
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	35	$ 18,995.90	$ 542.74	0	0	0	0	0	35
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	7	$ 3,188.92	$ 455.56	0	0	0	0	0	7
Desalination:									
Brackish Groundwater Desalination	100	$ 50,551.00	$ 505.51	100	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

***City of Weslaco and HCCID #9 water rights**

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	3,796	3,164	2,437	1,625	697	234

WATER SUPPLY AND DEMAND ANALYSIS

HEBBRONVILLE

Year		2010	2020	2030	2040	2050	2060
Total Population	4498	4,764	5,098	5,354	5,569	5,509	5,302
Total Water Demand		747	799	840	873	864	831
Advanced Water Conservation WMS (ac-ft)		16	40	60	81	86	83
Net Water Demand (ac-ft)		731	759	780	792	778	748

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts			MUNI						
Groundwater*		900.0	GW						
Total Supply (AF/yr)		900.0		900	900	900	900	900	900
Projected Supply Surplus/Deficit				169	141	120	108	122	152

Evaluation of Selected Water Management Strategies — Additional Supply by Decade

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	8	$ 890.53	$ 112.47	2	4	6	8	7	6
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Based on well capacity of 0.8 MGD

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	171	145	126	116	130	158

WATER SUPPLY AND DEMAND ANALYSIS

EAGLE PASS

					2010	2020	2030	2040	2050	2060
Year					**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population				22413	23,800	25,267	26,654	27,856	28,956	29,849
Total Water Demand					5,012	5,321	5,613	5,866	6,098	6,286
Advanced Water Conservation WMS (ac-ft)					80	198	299	406	454	468
Net Water Demand (ac-ft)					**4,932**	**5,123**	**5,314**	**5,460**	**5,644**	**5,818**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts*	3998, 2671	8,667.0	MUNI							
Groundwater		0.0	GW							
Contract to El Indio WSC		1,253.0								
Total Supply (AF/yr)		**7,414.0**			**6,454**	**6,140**	**5,852**	**5,599**	**5,372**	**5,177**
Projected Supply Surplus/Deficit					**1,522**	**1,017**	**538**	**139**	**-272**	**-641**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	55	$ 6,182.96	$ 112.47		10	21	31	40	48	55
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination**	641	$ 324,031.91	$ 505.51		0	260	260	260	272	641
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*City of Eagle Pass and Maverick County WID water rights
** Desal as an option in the future as indicated in survey

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	1,532	1,298	829	439	48	55

WATER SUPPLY AND DEMAND ANALYSIS

EL INDIO WSC

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	5235	6,994	8,855	10,615	12,140	13,536	14,668
Total Water Demand		1,293	1,637	1,962	2,244	2,502	2,711
Advanced Water Conservation WMS (ac-ft)		39	69	107	136	167	181
Net Water Demand (ac-ft)		**1,254**	**1,568**	**1,855**	**2,108**	**2,335**	**2,530**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts		1,253.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**1,253.0**		**1,253**	**1,567**	**1,855**	**2,108**	**2,335**	**2,530**
Projected Supply Surplus/Deficit				**-1**	**-1**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	70	$ 7,843.45	$ 112.47		13	27	40	51	61	70
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	1	$ 542.74	$ 542.74		1	1	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ 22.78	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	13	27	40	51	61	69

WATER SUPPLY AND DEMAND ANALYSIS

LA GRULLA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	1211	1,211	1,211	1,211	1,211	1,211	1,211
Total Water Demand		643	643	643	643	643	643
Advanced Water Conservation WMS (ac-ft)		4	8	12	16	19	19
Net Water Demand (ac-ft)		**639**	**635**	**631**	**627**	**624**	**624**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	863	522.1	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**522.1**		**522**	**522**	**522**	**522**	**522**	**522**
Projected Supply Surplus/Deficit				**-117**	**-113**	**-109**	**-105**	**-102**	**-102**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	111	$ 60,325.55	$ 542.74	111	107	104	100	97	97
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	6	$ 2,665.03	$ 455.56	6	6	5	5	5	5
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

RIO GRANDE CITY

Year					2010	2020	2030	2040	2050	2060
Total Population				11923	13,061	14,277	15,529	16,791	18,035	19,229
Total Water Demand					2,633	2,879	3,131	3,386	3,636	3,877
Advanced Water Conservation WMS (ac-ft)					59	128	174	245	283	302
Net Water Demand (ac-ft)					**2,574**	**2,751**	**2,957**	**3,141**	**3,353**	**3,575**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	851	2,736.0	MUNI							
Groundwater		0.0	GW							
Contracts to El Tanque, El Salz, Rio WSC		257.2								
Total Supply (AF/yr)		**2,478.8**			**2,479**	**2,479**	**2,479**	**2,479**	**2,479**	**2,479**
Projected Supply Surplus/Deficit					**-96**	**-272**	**-478**	**-663**	**-874**	**-1,097**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	50	$ 15,223.00	$ 304.46		0	10	50	50	50	50
Advanced Water Conservation Measures	54	$ 6,074.87	$ 112.47		8	17	27	36	45	54
Non-Potable Water Re-use	50	$ 20,761.00	$ 415.22		0	10	50	50	50	50
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	55	$ 29,850.70	$ 542.74		5	14	24	33	44	55
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	1,120	$ 566,171.20	$ 505.51		560	1120	1120	1120	1120	1120
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	478	899	792	626	435	232

WATER SUPPLY AND DEMAND ANALYSIS

RIO WSC

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	2076	2,942	3,868	4,821	5,782	6,729	7,638
Total Water Demand		498	654	815	978	1,138	1,292
Advanced Water Conservation WMS (ac-ft)		13	30	43	65	75	86
Net Water Demand (ac-ft)		**485**	**624**	**772**	**913**	**1,063**	**1,206**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	339, 851	310.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**310.0**		**310**	**310**	**310**	**310**	**310**	**310**
Projected Supply Surplus/Deficit				**-175**	**-314**	**-462**	**-603**	**-753**	**-896**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	41	$ 4,624.75	$ 112.47	6	13	20	27	34	41
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	851	$ 461,980.29	$ 542.74	166	298	439	573	715	851
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	45	$ 20,409.09	$ 455.56	9	16	23	30	38	45
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Rio WSC water right and contract from Rio Grande City

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	7	14	20	27	35	41

WATER SUPPLY AND DEMAND ANALYSIS

ROMA CITY

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	9617	11,097	12,678	14,306	15,948	17,566	19,118
Total Water Demand		2,784	3,181	3,590	4,002	4,408	4,797
Advanced Water Conservation WMS (ac-ft)		62	128	192	250	295	321
Net Water Demand (ac-ft)		**2,722**	**3,053**	**3,398**	**3,752**	**4,113**	**4,476**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	730, 814	2,841.2	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**2,841.2**		**2,842**	**2,842**	**2,842**	**2,842**	**2,842**	**2,842**
Projected Supply Surplus/Deficit				**121**	**-211**	**-555**	**-910**	**-1,270**	**-1,633**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	70	$ 7,899.99	$ 112.47	11	23	35	47	59	70
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	1,552	$ 842,332.48	$ 542.74	0	200	527	864	1207	1552
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	82	$ 37,242.03	$ 455.56	0	10.6	27.85	45.55	63.6	81.75
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	131	22	34	47	59	71

WATER SUPPLY AND DEMAND ANALYSIS

EL CENIZO

Year		2010	2020	2030	2040	2050	2060
Total Population	3545	5,929	8,729	11,865	15,315	19,085	23,068
Total Water Demand		697	1,027	1,396	1,801	2,245	2,713
Advanced Water Conservation WMS (ac-ft)		27	59	93	137	171	207
Net Water Demand (ac-ft)		**670**	**968**	**1,303**	**1,664**	**2,074**	**2,506**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	2720	879.9	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)**		**879.9**		**880**	**910**	**927**	**938**	**946**	**952**
Projected Supply Surplus/Deficit				**209**	**-59**	**-376**	**-725**	**-1,128**	**-1,554**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
				Additional Supply by Decade					
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	144	$ 16,233.19	$ 112.47	18	38	62	87	115	144
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	1,476	$ 801,247.06	$ 542.74	0	56.05	357.2	688.75	1071.6	1476.3
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	78	$ 35,397.01	$ 455.56	0	2.95	18.8	36.25	56.4	77.7
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Webb County Water Utility
**Projected supply based on Webb County Water Utility supply

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	227	39	62	87	115	144

WATER SUPPLY AND DEMAND ANALYSIS

LAREDO

Year				2000	2010	2020	2030	2040	2050	2060
Total Population				176,576	234,423	302,377	378,468	462,176	553,670	650,317
Total Water Demand					52,517	67,741	84,788	103,541	124,038	145,690
Advanced Water Conservation WMS (ac-ft)					1,050	2,710	4,239	5,695	7,442	8,741
Net Water Demand (ac-ft)					**51,467**	**65,031**	**80,549**	**97,846**	**116,596**	**136,949**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts	3997	46,037.1	MUNI		46,037	46037.1	46037.1	46037.1	46037.1	46037.1
Groundwater		137.0	GW		137.0	137.0	137.0	137.0	137.0	137.0
Total Supply (AF/yr)		**46,174.1**			**46,174**	**46,174**	**46,174**	**46,174**	**46,174**	**46,174**
Projected Supply Surplus/Deficit					**-5,293**	**-18,857**	**-34,375**	**-51,672**	**-70,422**	**-90,775**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	15,000	$ 4,566,900.00	$ 304.46		1,553	5,000	15,000	15,000	15,000	15,000
Advanced Water Conservation Measures	3,502	$ 393,911.24	$ 112.47		428	930	1,493	2,111	2,788	3,502
Non-Potable Water Re-use	11,200	$ 4,650,464.00	$ 415.22		1,120	5,600	5,600	5,600	5,600	11,200
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	49,863	$ 27,062,644.62	$ 542.74		1,425	2,524	7,766	18,367	36,313	49,863
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	1,109	$ 505,102.15	$ 455.56		75	133	409	494	621	1,109
Desalination:										
Brackish Groundwater Desalination	10,100	$ 5,105,651.00	$ 505.51		1,120	5,600	5,600	10,100	10,100	10,100
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	428	930	1,493	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

RIO BRAVO

Year		2010	2020	2030	2040	2050	2060
Total Population	5553	8,318	11,566	15,203	19,205	23,579	28,199
Total Water Demand		1,137	1,581	2,078	2,625	3,222	3,854
Advanced Water Conservation WMS (ac-ft)		47	91	153	215	264	316
Net Water Demand (ac-ft)		**1,090**	**1,490**	**1,925**	**2,410**	**2,958**	**3,538**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts*	2720	1,234.4	MUNI						
Groundwater		0.0	GW						
Contracts									
Total Supply (AF/yr)		**1,234.4**		**1,234**	**1,205**	**1,188**	**1,177**	**1,169**	**1,164**
Projected Supply Surplus/Deficit*				**144**	**-285**	**-737**	**-1,233**	**-1,789**	**-2,375**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	167	$ 18,829.94	$ 112.47	20	44	71	101	133	167
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	2,256	$ 1,224,557.13	$ 542.74	0	270.75	700.15	1171.35	1699.55	2256.25
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	119	$ 54,097.75	$ 455.56	0	14.25	36.85	61.65	89.45	118.75
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by Webb County Water Utility
**Projected supply based on Webb County Water Utility supply

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	164	44	72	101	133	168

WATER SUPPLY AND DEMAND ANALYSIS

WEBB COUNTY WATER UTILITY

Year		2010	2020	2030	2040	2050	2060
Total Population	851	1,326	1,884	2,509	3,197	3,949	4,743
Total Water Demand		247	350	467	594	734	882
Advanced Water Conservation WMS (ac-ft)		7	15	25	36	44	53
Net Water Demand (ac-ft)		**240**	**335**	**442**	**558**	**690**	**829**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts	2720	2,311.1	MUNI						
Groundwater		0.0	GW						
Contract to Rio Bravo and El Cenizo		2,114.0							
Total Supply (AF/yr)		**197.1**		**197**	**196**	**196**	**196**	**196**	**196**
Projected Supply Surplus/Deficit				**-43**	**-139**	**-246**	**-362**	**-494**	**-633**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	10	$ 3,044.60	$ 304.46	0	0	0	10	10	10
Advanced Water Conservation Measures	29	$ 3,236.16	$ 112.47	4	8	12	17	23	29
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	591	$ 320,759.34	$ 542.74	41	132	234	334	459	591
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	32	$ 14,418.47	$ 455.56	2	7	12	18	25	32
Desalination:									
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

Surplus/Deficit after WMS's	4	8	13	17	23	28

WATER SUPPLY AND DEMAND ANALYSIS

LYFORD

Year		2010	2020	2030	2040	2050	2060
Total Population	1973	2,091	2,207	2,313	2,398	2,456	2,485
Total Water Demand		307	324	339	352	360	365
Advanced Water Conservation WMS (ac-ft)		9	17	26	35	39	39
Net Water Demand (ac-ft)		**298**	**307**	**313**	**317**	**321**	**326**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	811, 821	980.3	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**980.3**		**980**	**980**	**980**	**980**	**980**	**980**
Projected Supply Surplus/Deficit				**683**	**674**	**667**	**663**	**659**	**654**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	4	$ 425.72	$ 112.47		1	2	3	3	4	4
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	100	$ 50,551.00	$ 505.51		0	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Delta Lake ID
*Interconnect with Willacy Desal. Plant

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	684	775	770	766	762	758

WATER SUPPLY AND DEMAND ANALYSIS

NORTH ALAMO WSC (Willacy County)

Year					2010	2020	2030	2040	2050	2060
Total Population				5696	7,187	8,649	9,981	11,052	11,781	12,141
Total Water Demand					773	930	1,073	1,188	1,267	1,306
Advanced Water Conservation WMS (ac-ft)					40	78	112	136	145	150
Net Water Demand (ac-ft)					**733**	**853**	**961**	**1,052**	**1,122**	**1,156**
Current Water Supply	**Water Right Number**	**Amount**	**Type**							
Amistad-Falcon Water Right/Contracts			MUNI		1,217	1097.9	990.799	889.001	786.122	690.312
Groundwater			GW		79	71	64	58	51	51
Total Supply (AF/yr)		**1,296.2**			**1,296**	**1,169**	**1,055**	**947**	**837**	**741**
Projected Supply Surplus/Deficit*					**563**	**317**	**94**	**-105**	**-285**	**-415**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	48	$ 5,358.96	$ 112.47		11	22	32	40	45	48
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	11,201	$ 5,662,217.51	$ 505.51		11,201	11201	11201	11201	11201	11201
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Based on water available for Willacy County only

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	11,776	11,539	11,327	11,135	10,961	10,834

WATER SUPPLY AND DEMAND ANALYSIS

RAYMONDVILLE

Year		2010	2020	2030	2040	2050	2060
Total Population	9733	10,071	10,402	10,704	10,947	11,112	11,194
Total Water Demand		1,726	1,783	1,834	1,876	1,904	1,918
Advanced Water Conservation WMS (ac-ft)		2	5	7	9	10	11
Net Water Demand (ac-ft)		**45**	**82**	**120**	**159**	**174**	**176**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	811	5,670.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**5,670.0**		**5,670**	**5,670**	**5,670**	**5,670**	**5,670**	**5,670**
Projected Supply Surplus/Deficit				**5,625**	**5,588**	**5,550**	**5,511**	**5,496**	**5,494**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	11	$ 1,214.81	$ 112.47		2	5	7	9	10	11
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination*	100	$ 50,551.00	$ 505.51		0	100	100	100	100	100
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

*Supplied by Delta Lake ID
*Interconnect with Willacy Desal. Plant

Surplus/Deficit after WMS's	2010	2020	2030	2040	2050	2060
	5,627	5,693	5,657	5,620	5,606	5,605

WATER SUPPLY AND DEMAND ANALYSIS

SAN PERLITA

		2010	2020	2030	2040	2050	2060
Year		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population	680	747	812	871	919	952	968
Total Water Demand		109	118	127	134	139	141
Advanced Water Conservation WMS (ac-ft)		3	6	10	13	15	15
Net Water Demand (ac-ft)		**106**	**112**	**117**	**121**	**124**	**126**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *		120.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**120.0**		**120**	**120**	**120**	**120**	**120**	**120**
Projected Supply Surplus/Deficit				**14**	**8**	**3**	**-1**	**-4**	**-6**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	2	$ 239.47	$ 112.47	0	1	1	2	2	2
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acquisition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract	0	$ -	$ 455.56	0	0	0	0	0	0
Desalination:									
Brackish Groundwater Desalination*	25	$ 12,637.75	$ 505.51	25	25	25	25	25	25
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

*Supplied by NAWSC
*Interconnect with NAWSC Desal. Plant

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	40	34	29	26	23	21

WATER SUPPLY AND DEMAND ANALYSIS

SEBASTIAN MUD

Year		2010	2020	2030	2040	2050	2060
Total Population	1615	2,038	2,452	2,830	3,134	3,340	3,442
Total Water Demand		267	321	371	411	438	451
Advanced Water Conservation WMS (ac-ft)		11	25	38	49	56	58
Net Water Demand (ac-ft)		**256**	**296**	**333**	**362**	**382**	**393**

Current Water Supply	Water Right Number	Amount	Type	2010	2020	2030	2040	2050	2060
Amistad-Falcon Water Right/Contracts *	803	300.0	MUNI						
Groundwater		0.0	GW						
Total Supply (AF/yr)		**300.0**		**300**	**300**	**300**	**300**	**300**	**300**
Projected Supply Surplus/Deficit				**44**	**4**	**-33**	**-62**	**-82**	**-93**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	14	$ 1,519.13	$ 112.47		3	6	9	11	13	14
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	88	$ 47,951.08	$ 542.74		0	0	31.35	58.9	77.9	88.35
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	5	$ 2,118.35	$ 455.56		0	0	1.65	3.1	4.1	4.65
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

***Supplied by LaFeria ID, CCID #3**

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	48	10	9	11	13	13

WATER SUPPLY AND DEMAND ANALYSIS

ZAPATA

						2010	2020	2030	2040	2050	2060
Year						**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Total Population					4856	4,856	4,856	4,856	4,856	4,856	4,856
Total Water Demand						1,050	1,050	1,050	1,050	1,050	1,050
Advanced Water Conservation WMS (ac-ft)						16	33	49	65	76	76
Net Water Demand (ac-ft)						**1,034**	**1,017**	**1,001**	**985**	**974**	**974**
Current Water Supply	**Water Right Number**	**Amount**	**Type**								
Amistad-Falcon Water Right/Contracts	803, 2804, 2806	1,905.2	MUNI								
Groundwater		0.0	GW								
Total Supply (AF/yr)		**1,905.2**				**1,905**	**1,905**	**1,905**	**1,905**	**1,905**	**1,905**
Projected Supply Surplus/Deficit						**872**	**888**	**904**	**920**	**931**	**931**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acquisition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract	0	$ -	$ 455.56		0	0	0	0	0	0
Desalination:										
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

	2010	2020	2030	2040	2050	2060
Surplus/Deficit after WMS's	872	888	904	920	931	931

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Region M Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	1,209,647	1,163,633	1,082,231	981,749	981,749	981,749	981,749

Current Water Supply Type	Source							
Total Supply (AF/yr)		735,291	752,996	746,007	739,519	733,031	726,541	720,552
Projected Supply Surplus/Deficit		-474,356	-410,638	-336,224	-242,230	-248,718	-255,208	-261,197

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	219,226	$ 55,547,585.23	$ 253.38		36,529	73,085	109,613	146,142	182,698	219,226
Conveyance System Conservation	218,783	$ 26,402,708.30	$ 120.68		91,160	182,319	191,435	200,551	209,667	218,783
Total WMS Yield					127,688	255,404	301,048	346,693	392,365	438,009

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Zapata County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		7,763	6,454	6,121	5,805	5,805	5,805	5,805

Current Water Supply Type	Source	2000	2010	2020	2030	2040	2050	2060
Surface Water	Amistad/Falcon	3,991	3,960	3,920	3,884	3,847	3,810	3,776
Surface Water	Tributaries	83	116	116	116	116	116	116
Ground Water		1,000	0	0	0	0	0	0
Total Supply (AF/yr)		**5,074**	**4,076**	**4,036**	**4,000**	**3,963**	**3,926**	**3,892**
Projected Supply Surplus/Deficit		**-2,689**	**-2,378**	**-2,085**	**-1,805**	**-1,842**	**-1,879**	**-1,913**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	0	$ -	$ 253.38		0	0	0	0	0	0
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Willacy County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			58,586	59,191	60,203	60,623	60,623	60,623	60,623
Current Water Supply	**Source**								
Surface Water	AMISTAD/FALCON		34,525	34,257	33,915	33,598	33,281	32,964	32,672
Surface Water	IRRIGATION LOCAL SUPPLY		899	899	899	899	899	899	899
Ground Water	GULF COAST		30	0	0	0	0	0	0
Total Supply (AF/yr)		**0**	**35,454**	**35,156**	**34,814**	**34,497**	**34,180**	**33,863**	**33,571**
Projected Supply Surplus/Deficit			**-23,132**	**-24,035**	**-25,389**	**-26,126**	**-26,443**	**-26,760**	**-27,052**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
On-Farm Conservation	7,808	$ 1,978,391.04	$ 253.38		1,301	2602.99	3904	5205.01	6506.99	7808
Conveyance System Conservation	9,345	$ 1,127,718.40	$ 120.68		3,894	7,787	8,177	8,566	8,955	9,345

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Webb County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			23,723	20,507	19,548	18,654	18,654	18,654	18,654
Current Water Supply	**Source**								
Surface Water	AMISTAD/FALCON		10603	10520	10415	10318	10221	10123	10034
Surface Water	TRIBS TO RIO GRANDE		29.65	20	20	20	20	20	20
Surface Water	TRIBS TO RIO GRANDE		148.25	98	98	98	98	98	98
Surface Water	TRIBS TO RIO GRANDE		29.65	33	33	33	33	33	33
Surface Water	TRIBS TO RIO GRANDE		118.6	0	0	0	0	0	0
Surface Water	TRIBS TO RIO GRANDE		0	0	0	0	0	0	0
Surface Water	TRIBS TO RIO GRANDE		0	0	0	0	0	0	0
Surface Water	REUSE		795	1120	1120	1120	1120	1120	1120
Ground Water	CARRIZO-WILCOX		1963	135.3719	135.3719	135.372	135.372	135.372	135.372
Ground Water	CARRIZO-WILCOX		1014	1043.16	1043.16	1043.16	1043.16	1043.16	1043.16
Ground Water	GULF COAST		6	47.17505	47.17505	47.1751	47.1751	47.1751	47.1751
Ground Water	GULF COAST		28	67.3946	67.3946	67.3946	67.3946	67.3946	67.3946
Ground Water	GULF COAST		56	363.5254	363.5254	363.525	363.525	363.525	363.525
Ground Water	OTHER AQUIFER		446	22.56198	22.56198	22.562	22.562	22.562	22.562
Ground Water	OTHER AQUIFER		62	32.2322	32.2322	32.2322	32.2322	32.2322	32.2322
Ground Water	OTHER AQUIFER		492	173.86	173.86	173.86	173.86	173.86	173.86
Total Supply (AF/yr)		**0**	**15791.2**	**13676.28**	**13571.28**	**13474.3**	**13377.3**	**13279.3**	**13190.3**
Projected Supply Surplus/Deficit			**-7,932**	**-6,830**	**-5,977**	**-5,179**	**-5,276**	**-5,374**	**-5,463**

Evaluation of Selected Water Management Strategies

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		Additional Supply by Decade 2010	2020	2030	2040	2050	2060
On-Farm Conservation	0	$ -	$ 253.38		0	0	0	0	0	0
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Starr County

Year	Type		2000	2010	2020	2030	2040	2050	2060
Total Water Demand			30,693	31,191	30,108	29,070	29,070	29,070	29,070
Current Water Supply	**Type**								
Surface Water	AMISTAD/FALCON		15,896	15,773	15,616	15,470	15,324	15,178	15,043
Ground Water	GULF COAST		470	180	180	180	180	180	180
Ground Water	GULF COAST		1,523	576	576	576	576	576	576
Ground Water	OTHER AQUIFER		229	18	18	18	18	18	18
Ground Water	OTHER AQUIFER		1,927	5,821	5,821	5,821	5,821	5,821	5,821
Total Supply (AF/yr)		**0**	**20,045**	**22,368**	**22,211**	**22,065**	**21,919**	**21,773**	**21,638**
Projected Supply Surplus/Deficit			**-10,648**	**-8,823**	**-7,897**	**-7,005**	**-7,151**	**-7,297**	**-7,432**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Conservation	6,315	$ 1,600,145.38	$ 253.38		1,052	2105.33	3157.6	4209.87	5262.93	6315.2
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Maverick County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			93,145	95,040	91,693	87,863	87,863	87,863	87,863

Current Water Supply	Source								
Surface Water	AMISTAD/FALCON		54,176	53,755	53,219	52,722	52,224	51,727	51,268
Surface Water	REUSE		123	0	0	0	0	0	0
Surface Water	TRIBS TO RIO GRANDE		184	223	223	223	223	223	223
Surface Water	TRIBS TO RIO GRANDE		12	20	20	20	20	20	20
Ground Water	CARRIZO-WILCOX		37	729	729	729	729	729	729
Ground Water	CARRIZO-WILCOX		1,370	635	635	635	635	635	635
Ground Water	OTHER AQUIFER		879	4,224	4,224	4,224	4,224	4,224	4,224
Ground Water	OTHER AQUIFER		72	28	28	28	28	28	28
Total Supply (AF/yr)		**0**	**56,853**	**59,613**	**59,077**	**58,580**	**58,082**	**57,585**	**57,126**
Projected Supply Surplus/Deficit			**-36,292**	**-35,426**	**-32,616**	**-29,283**	**-29,781**	**-30,278**	**-30,737**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	12,918	$ 3,273,061.49	$ 253.38		2,152	4306.405	6458.8	8611.2	10765.2	12917.6
Conveyance System Conservation	24,944	$ 3,010,290.19	$ 120.68		10,394	20,787	21,826	22,866	23,905	24,944

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Jim Hogg County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		6,413	817	817	817	817	817	817

Current Water Supply	Source							
Ground Water	GULF COAST	4,799	735	735	735	735	735	735
Ground Water	GULF COAST	1,614	82	82	82	82	82	82
Total Supply (AF/yr)		**6,413**	**817**	**817**	**817**	**817**	**817**	**817**
Projected Supply Surplus/Deficit		**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	0	$ -	$ 253.38		0	0	0	0	0	0
Conveyance System Conservation	0	$ -	$ 120.68		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Hidalgo County

Year			2000	2010	2020	2030	2040	2050	2060
Total Water Demand			611,399	583,030	525,971	453,772	453,772	453,772	453,772
Current Water Supply	**Source**								
Surface Water	AMISTAD/FALCON		360,331	357,532	353,969	350,661	347,353	344,045	340,991
Surface Water	AMISTAD/FALCON		2,928	2,905	2,877	2,850	2,823	2,796	2,771
Surface Water	REUSE		166	4,288	4,288	4,288	4,288	4,288	4,288
Surface Water	IRRIGATION LOCAL SUPPLY		79	79	79	79	79	79	79
Ground Water	GULF COAST		4,330	19,383	19,383	19,383	19,383	19,383	19,383
Ground Water	GULF COAST		185	1,020	1,020	1,020	1,020	1,020	1,020
Total Supply (AF/yr)		**0**	**368,019**	**385,207**	**381,616**	**378,281**	**374,946**	**371,611**	**368,532**
Projected Supply Surplus/Deficit			**-243,380**	**-197,823**	**-144,355**	**-75,491**	**-78,826**	**-82,161**	**-85,240**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	130,228	$ 32,997,170.64	$ 253.38		21,699	43414.76	65114	86813.2	108529	130228
Conveyance System Conservation	118,958	$ 14,355,899.71	$ 120.68		49,566	99,132	104,089	109,045	114,002	118,958

WATER SUPPLY AND DEMAND ANALYSIS

Irrigation: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		377,925	367,404	347,771	325,144	325,144	325,144	325,144

Current Water Supply	Source	2000	2010	2020	2030	2040	2050	2060
Surface Water	AMISTAD/FALCON	214,002	212,340	210,224	208,259	206,295	204,330	202,516
Surface Water	AMISTAD/FALCON	10,300	10,220	10,118	10,023	9,929	9,834	9,747
Surface Water	REUSE	236	239	239	239	239	239	239
Surface Water	IRRIGATION LOCAL SUPPLY	2,610	2,610	2,610	2,610	2,610	2,610	2,610
Ground Water	GULF COAST	494	6,673	6,673	6,673	6,673	6,673	6,673
Total Supply (AF/yr)		**227,642**	**232,082**	**229,864**	**227,804**	**225,746**	**223,686**	**221,785**
Projected Supply Surplus/Deficit		**-150,283**	**-135,322**	**-117,907**	**-97,340**	**-99,398**	**-101,458**	**-103,359**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
On-Farm Water Conservation	61,958	$ 15,698,816.69	$ 253.38		10,324	20655.1	30978.8	41302.5	51633.9	61957.6
Conveyance System Conservation	65,535	$ 7,908,800.00	$ 120.68		27,306	54,613	57,343	60,074	62,805	65,535

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	6,208	7,509	8,274	8,966	9,654	10,256	11,059

Current Water Supply	Source							
Total Supply (AF/yr)		**7,517**	**6,549**	**6,552**	**6,555**	**6,558**	**6,560**	**6,563**
Projected Supply Surplus/Deficit		**0**	**-960**	**-1,722**	**-2,411**	**-3,096**	**-3,696**	**-4,496**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		1,000	1,000	1,000	1,000	1,100	1,200
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	3,020	$ 1,253,964.40	$ 415.22		811	1,245	1,638	2,027	2,464	3,020
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	304	$ 164,992.96	$ 542.74		110	110	110	110	165	304
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Zapata County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply	Source							
Total Supply (AF/yr)		0	0	0	0	0	0	0
Projected Supply Surplus/Deficit		0	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Willacy County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		25	25	25	25	25	25	25
Current Water Supply	**Supple**							
Surface Water	AMISTAD/FALCON	0	0	0	0	0	0	0
Surface Water*	OTHER LOCAL SUPPLY	0	0	0	0	0	0	0
Total Supply (AF/yr)		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit		**-25**	**-25**	**-25**	**-25**	**-25**	**-25**	**-25**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	15	$ 6,228.30	$ 415.22	15	15	15	15	15	15
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	10	$ 5,427.40	$ 542.74	10	10	10	10	10	10
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		23	28	31	34	37	39	42
Current Water Supply	**Supply**							
Surface Water	AMISTAD/FALCON	43.4145	0	0	0	0	0	0
Ground Water	OTHER AQUIFER	4	2.74393	3.04287	3.33693	3.63274	3.82508	4.11875
Ground Water	OTHER AQUIFER	1	4.11165	4.55012	4.99202	5.43113	5.72607	6.16722
Ground Water	OTHER AQUIFER	5	21.1444	23.407	25.6711	27.9361	29.4488	31.714
Total Supply (AF/yr)		**53.4145**	**28**	**31**	**34**	**37**	**39**	**42**
Projected Supply Surplus/Deficit		**30**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Starr County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply	Source							
Total Supply (AF/yr)		0	0	0	0	0	0	0
Projected Supply Surplus/Deficit		0	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Maverick County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		56	64	69	73	77	80	85
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	76	114	114	114	114	114	114
Total Supply (AF/yr)		**76**	**114**	**114**	**114**	**114**	**114**	**114**
Projected Supply Surplus/Deficit		**20**	**50**	**45**	**41**	**37**	**34**	**29**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Jim Hogg County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply	Source							
Total Supply (AF/yr)		0	0	0	0	0	0	0
Projected Supply Surplus/Deficit		0	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Hidalgo County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		2,674	3,236	3,559	3,851	4,143	4,403	4,742

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	3,718	3,240	3,240	3,240	3,240	3,240	3,240
Ground Water	GULF COAST	60	908	908	908	908	908	908
Ground Water	GULF COAST	17	0	0	0	0	0	0
Total Supply (AF/yr)		**3,795**	**4,148**	**4,148**	**4,148**	**4,148**	**4,148**	**4,148**
Projected Supply Surplus/Deficit		**1,121**	**912**	**589**	**297**	**5**	**-255**	**-594**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	200	$ 60,892.00	$ 304.46	0	0	0	0	100	200
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	200	$ 83,044.00	$ 415.22	0	0	0	0	100	200
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	194	$ 105,291.56	$ 542.74	0	0	0	0	55	194
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

912	589	297	5	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Manufacturing: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		3,430	4,156	4,590	4,983	5,372	5,709	6,165

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	1,354	20	20	20	20	20	20
Surface Water	INDIRECT REUSE	2,239	2,240	2,240	2,240	2,240	2,240	2,240
Total Supply (AF/yr)		**3,593**	**2,260**	**2,260**	**2,260**	**2,260**	**2,260**	**2,260**
Projected Supply Surplus/Deficit		**163**	**-1,896**	**-2,330**	**-2,723**	**-3,112**	**-3,449**	**-3,905**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	1,000	1000	1000	1000	1000	1000
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	2,805	$ 1,164,692.10	$ 415.22	796	1230	1623	2012	2349	2805
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	100	$ 54,274.00	$ 542.74	100	100	100	100	100	100
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

0 0 0 0 0 0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	5,817	5,817	5,817	5,817	5,817	5,817	5,817

Current Water Supply	Source							
Total Supply (AF/yr)		**24,588**	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**	**5,817**
Projected Supply Surplus/Deficit		**18,771**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Zapata County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		474	474	474	474	474	474	474
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	446	0	0	0	0	0	0
Ground Water	OTHER AQUIFER	80	474	474	474	474	474	474
Total Supply (AF/yr)		**526**	**474**	**474**	**474**	**474**	**474**	**474**
Projected Supply Surplus/Deficit		**52**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Willacy County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		151	151	151	151	151	151	151

Current Water Supply	**Source**							
Ground Water	Gulf Coast	240	151	151	151	151	151	151
Total Supply (AF/yr)		**240**	**151**	**151**	**151**	**151**	**151**	**151**
Projected Supply Surplus/Deficit		**89**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1,513	1,513	1,513	1,513	1,513	1,513	1,513
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	313	0	0	0	0	0	0
Ground Water	GULF COAST	37	153	153	153	153	153	153
Ground Water	GULF COAST	159	21	21	21	21	21	21
Ground Water	GULF COAST	37	174	174	174	174	174	174
Ground Water	CARRIZO-WILCOX	11,170	440	440	440	440	440	440
Ground Water	CARRIZO-WILCOX	5,768	499	499	499	499	499	499
Ground Water	OTHER AQUIFER	36	73	73	73	73	73	73
Ground Water	OTHER AQUIFER	5	70	70	70	70	70	70
Ground Water	OTHER AQUIFER	39	83	83	83	83	83	83
Total Supply (AF/yr)		**17,564**	**1,513**	**1,513**	**1,513**	**1,513**	**1,513**	**1,513**
Projected Supply Surplus/Deficit		**16,051**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Starr County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1,117	1,117	1,117	1,117	1,117	1,117	1,117

Current Water Supply	Source	2000	2010	2020	2030	2040	2050	2060
Surface Water	LIVESTOCK LOCAL SUPPLY	679	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	37	0	0	0	0	0	0
Ground Water	GULF COAST	399	224	224	224	224	224	224
Ground Water	GULF COAST	259	793	793	793	793	793	793
Ground Water	OTHER AQUIFER	2	22	22	22	22	22	22
Ground Water	OTHER AQUIFER	8	78	78	78	78	78	78
Total Supply (AF/yr)		**1,384**	**1,117**	**1,117**	**1,117**	**1,117**	**1,117**	**1,117**
Projected Supply Surplus/Deficit		**267**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Maverick County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		260	260	260	260	260	260	260
Current Water Supply	**Source**							
Surface Water	LIVESTOCK LOCAL SUPPLY	761	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	436	0	0	0	0	0	0
Ground Water	CARRIZO-WILCOX	95	1	1	1	1	1	1
Ground Water	CARRIZO-WILCOX	87	80	80	80	80	80	80
Ground Water	OTHER AQUIFER	141	103	103	103	103	103	103
Ground Water	OTHER AQUIFER	19	76	76	76	76	76	76
Total Supply (AF/yr)		**1,539**	**260**	**260**	**260**	**260**	**260**	**260**
Projected Supply Surplus/Deficit		**1,279**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	104	$ 56,444.96	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Jim Hogg County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		518	518	518	518	518	518	518

Current Water Supply	Source	2000	2010	2020	2030	2040	2050	2060
Surface Water	LIVESTOCK LOCAL SUPPLY	120	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	139	0	0	0	0	0	0
Ground Water	GULF COAST	636	383	383	383	383	383	383
Ground Water	GULF COAST	89	135	135	135	135	135	135
Total Supply (AF/yr)		**984**	**518**	**518**	**518**	**518**	**518**	**518**
Projected Supply Surplus/Deficit		**466**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Hidalgo County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		681	681	681	681	681	681	681

Current Water Supply	Supply							
Surface Water	LIVESTOCK LOCAL SUPPLY	725	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	38	0	0	0	0	0	0
Ground Water	GULF COAST	71	647	647	647	647	647	647
Ground Water	GULF COAST	21	34	34	34	34	34	34
Total Supply (AF/yr)		**855**	**681**	**681**	**681**	**681**	**681**	**681**
Projected Supply Surplus/Deficit		**174**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Livestock: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1,103	1,103	1,103	1,103	1,103	1,103	1,103

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	73	0	0	0	0	0	0
Surface Water	LIVESTOCK LOCAL SUPPLY	826	0	0	0	0	0	0
Ground Water	GULF COAST	597	1103	1103	1103	1103	1103	1103
Total Supply (AF/yr)		**1496**	**1103**	**1103**	**1103**	**1103**	**1103**	**1103**
Projected Supply Surplus/Deficit		**393**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Summary

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	6780	13463	16864	19716	23192	27430	32598

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	**21,883**	**16,216**	**16,216**	**16,216**	**16,216**	**16,216**	**16,216**
Projected Supply Surplus/Deficit	**0**	**2,753**	**-649**	**-3,501**	**-6,977**	**-11,215**	**-16,383**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	118	400
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	10,800	$ 4,484,376.00	$ 415.22		0	1,000	2,000	4,000	7,250	10,800
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:					0	0	0	0	0	0
Purchase	5,183	$ 2,813,021.42	$ 542.74		0	980	2,374	3,291	3,847	5,183
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56		0	0	0	0	0	0
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Zapata County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	0	0	0	0	0	0	0
Projected Supply Surplus/Deficit	0	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Willacy County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0
Current Water Supply							
Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1795	1492	1190	1391	1636	1935	2300
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	2,195	1,645	1,645	1,645	1,645	1,645	1,645
Total Supply (AF/yr)		**2,195**	**1,645**	**1,645**	**1,645**	**1,645**	**1,645**	**1,645**
Projected Supply Surplus/Deficit		**400**	**153**	**455**	**254**	**9**	**-291**	**-656**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	256	$ 77,941.76	$ 304.46		0	0	0	0	91	256
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	400	$ 166,088.00	$ 415.22		0	0	0	0	200	400
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Starr County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	0	0	0	0	0	0	0
Projected Supply Surplus/Deficit	0	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Maverick County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

Total Supply (AF/yr)	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Projected Supply Surplus/Deficit	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Jim Hogg County

Year	2000	2010	2020	2030	2040	2050	2060
Total Water Demand	0	0	0	0	0	0	0

Current Water Supply

	2000	2010	2020	2030	2040	2050	2060
Total Supply (AF/yr)	0	0	0	0	0	0	0
Projected Supply Surplus/Deficit	0	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Hidalgo County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		3487	10355	14151	16545	19462	23018	27354
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	6,243	5,941	5,941	5,941	5,941	5,941	5,941
Surface Water	REUSE	9,856	5,040	5,040	5,040	5,040	5,040	5,040
Ground Water	GULF COAST	1,190	1,190	1,190	1,190	1,190	1,190	1,190
Total Supply (AF/yr)		**17,289**	**12,171**	**12,171**	**12,171**	**12,171**	**12,171**	**12,171**
Projected Supply Surplus/Deficit		**13,802**	**1,816**	**-1,980**	**-4,374**	**-7,291**	**-10,847**	**-15,183**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	10,000	$ 4,152,200.00	$ 415.22		0	1000	2000	4000	7000	10000
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	5,183	$ 2,813,021.42	$ 542.74		0	980	2374	3291	3847	5183
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Steam Electric: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1498	1616	1523	1780	2094	2477	2944
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	2400	2400	2400	2400	2400	2400	2400
Total Supply (AF/yr)		**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**
Projected Supply Surplus/Deficit		**902**	**784**	**877**	**620**	**306**	**-77**	**-544**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	144	$ 43,842.24	$ 304.46		0	0	0	0	27	144
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	400	$ 166,088.00	$ 415.22		0	0	0	0	50	400
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Summary

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		3869	4186	4341	4433	4523	4612	4692
Current Water Supply	**Source**							
Total Supply (AF/yr)		**17,842**	**4,941**	**5,087**	**5,168**	**5,249**	**5,329**	**5,397**
Projected Supply Surplus/Deficit		**13,973**	**755**	**746**	**735**	**726**	**717**	**705**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Zapata County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		27	24	23	23	23	23	23
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	135	134	132	131	130	129	127
Groundwater	OTHER AQUIFER	1,000	0	0	0	0	0	0
Total Supply (AF/yr)		**1,135**	**134**	**132**	**131**	**130**	**129**	**127**
Projected Supply Surplus/Deficit		**1,108**	**110**	**109**	**108**	**107**	**106**	**104**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Willacy County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		6	6	6	6	6	6	6

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	0	0	0	0	0	0	0
Ground Water	GULF COAST	30	6	6	6	6	6	6
Total Supply (AF/yr)		30	6	6	6	6	6	6
Projected Supply Surplus/Deficit		24	0	0	0	0	0	0

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Webb County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1262	1204	1192	1189	1187	1185	1180
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	228	226	224	222	220	218	216
Surface Water	AMISTAD/FALCON	313	311	308	305	302	299	297
Surface Water	AMISTAD/FALCON	111	110	109	108	107	106	104
Ground Water	CARRIZO-WILCOX	6,046	360	357	356	356	355	354
Ground Water	CARRIZO-WILCOX	3,122	158	156	156	155	155	154
Ground Water	GULF COAST	120	126	124	124	124	124	123
Ground Water	GULF COAST	518	96	95	95	95	95	94
Ground Water	GULF COAST	103	55	54	54	54	54	54
Ground Water	OTHER AQUIFER	9	60	60	59	59	59	59
Ground Water	OTHER AQUIFER	1	46	46	46	45	45	45
Ground Water	OTHER AQUIFER	10	26	26	26	26	26	26
Total Supply (AF/yr)		**10,581**	**1,574**	**1,559**	**1,551**	**1,543**	**1,536**	**1,526**
Projected Supply Surplus/Deficit		**9,319**	**370**	**367**	**362**	**356**	**351**	**346**

Evaluation of Selected Water Management Strategies | **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Starr County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1203	1315	1355	1373	1390	1407	1426
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	12	11	11	11	11	11	11
Surface Water	AMISTAD/FALCON	9	9	9.11787	8.70996	8.71814	8.71727	8.30135
Ground Water	GULF COAST	775	700.7	721.63	730.73	739.83	748.93	759.85
Ground Water	GULF COAST	502	495.95	511.42	518.7	525.07	531.44	537.81
Ground Water	OTHER AQUIFER	229	69.3	71.37	72.27	73.17	74.07	75.15
Ground Water	OTHER AQUIFER	771	49.05	50.58	51.3	51.93	52.56	53.19
Total Supply (AF/yr)		**2298**	**1335**	**1375.12**	**1392.71**	**1409.72**	**1426.72**	**1445.3**
Projected Supply Surplus/Deficit		**1095**	**20**	**20.1179**	**19.71**	**19.7181**	**19.7173**	**19.3014**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Maverick County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		140	156	162	166	169	172	175
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	35	35	35	34	34	34	33
Ground Water	CARRIZO-WILCOX	61	55	57	59	60	61	62
Ground Water	CARRIZO-WILCOX	55	24	26	26	27	27	28
Ground Water	OTHER AQUIFER	387	53	55	56	57	58	59
Ground Water	OTHER AQUIFER	55	24	25	25	25	26	26
Total Supply (AF/yr)		**593**	**191**	**197**	**200**	**203**	**206**	**208**
Projected Supply Surplus/Deficit		**453**	**35**	**35**	**34**	**34**	**34**	**33**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Jim Hogg County

Year	Source	2000	2010	2020	2030	2040	2050	2060
Total Water Demand		27	33	36	37	38	39	40
Current Water Supply	**Source**							
Ground Water	GULF COAST	1,140	37	37	37	37	37	37
Ground Water	GULF COAST	160	4	4	4	4	4	4
Total Supply (AF/yr)		**1,300**	**41**	**41**	**41**	**41**	**41**	**41**
Projected Supply Surplus/Deficit		**1,273**	**8**	**5**	**4**	**3**	**2**	**1**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Hidalgo County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		1196	1442	1561	1633	1704	1774	1836
Current Water Supply	**Source**							
Surface Water	AMISTAD/FALCON	174	183	182	181	179	177	175
Surface Water	AMISTAD/FALCON	33	23	22	21	21	21	20
Ground Water	GULF COAST	928	1,291	1,398	1,462	1,526	1,589	1,644
Ground Water	GULF COAST	272	151	163	171	178	185	192
Total Supply (AF/yr)		**1,407**	**1,648**	**1,765**	**1,835**	**1,904**	**1,972**	**2,031**
Projected Supply Surplus/Deficit		**211**	**206**	**204**	**202**	**200**	**198**	**195**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46	0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47	0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22	0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89	0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27	0	0	0	0	0	0
Acqusition of Water Rights:									
Purchase	0	$ -	$ 542.74	0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37	0	0	0	0	0	0
Contract		$ -	$ 455.56						
Desalination:	0			0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51	0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63	0	0	0	0	0	0

WATER SUPPLY AND DEMAND ANALYSIS

Mining: Cameron County

Year		2000	2010	2020	2030	2040	2050	2060
Total Water Demand		8	6	6	6	6	6	6

Current Water Supply	Source							
Surface Water	AMISTAD/FALCON	4	4	4	4	4	4	4
Ground Water	GULF COAST	494	8	8	8	8	8	8
Total Supply (AF/yr)		**498**	**12**	**12**	**12**	**12**	**12**	**12**
Projected Supply Surplus/Deficit		**490**	**6**	**6**	**6**	**6**	**6**	**6**

Evaluation of Selected Water Management Strategies — **Additional Supply by Decade**

Strategy	Yield (AF/yr)	Total Annual Cost	Unit Cost ($)		2010	2020	2030	2040	2050	2060
Additional Groundwater	0	$ -	$ 304.46		0	0	0	0	0	0
Advanced Water Conservation Measures	0	$ -	$ 112.47		0	0	0	0	0	0
Non-Potable Water Re-use	0	$ -	$ 415.22		0	0	0	0	0	0
Potable Water Re-use	0	$ -	$ 705.89		0	0	0	0	0	0
Brownsville Weir and Reservoir	0	$ -	$ 537.27		0	0	0	0	0	0
Acqusition of Water Rights:										
Purchase	0	$ -	$ 542.74		0	0	0	0	0	0
Urbanization	0	$ -	$ 368.37		0	0	0	0	0	0
Contract		$ -	$ 455.56							
Desalination:	0				0	0	0	0	0	0
Brackish Groundwater Desalination	0	$ -	$ 505.51		0	0	0	0	0	0
Seawater Desalination	0	$ -	$ 767.63		0	0	0	0	0	0

REGIONAL WATER PLAN

TECHNICAL MEMORANDUM

Water Management Strategies Cost Analysis Report

Prepared For: Rio Grande Regional Water Planning Group

Prepared By: Charlene Torres/ NRS Consulting Engineers

Date: Revised December 2005

REGIONAL WATER PLAN

This technical memorandum provides a cost evaluation of the Water Management Strategies being evaluated for Region M. They were each evaluated using TWDB standards explained in great detail in Exhibit B. Appendix A provides the actual text provided by Exhibit B.

The following Water Management Strategies were evaluated for this round of Regional Planning:

1. Acquisition of Water Rights Through Purchase
2. Acquisition of Water Rights Through Urbanization
3. Acquisition of Water Rights Through Contract
4. Brownsville Weir Project
5. Seawater Desalination
6. Brackish Water Desalination
7. Non-Potable Reuse
8. Potable Reuse
9. Groundwater Supplies
10. On Farm Conservation
11. Irrigation Conveyance System
12. Advanced Water Conservation Methods

Cost Summary

Water Management Strategy Cost Summary			
	Cost		
WMS	$/Acre-ft	$/1000 gallons	Attachment
Acquisition of Water Rights Through Purchase	$ 542.74	$ 1.67	B
Acquisition of Water Rights Through Urbanization	$ 368.37	$ 1.13	C
Acquisition of Water Rights Through Contract	$ 455.56	$ 1.40	D
Brownsville Weir	$ 537.27	$ 1.65	F
Seawater Desalination	$ 767.63	$ 2.36	G
Brackish Water Desalination	$ 505.51	$ 1.55	H
Non-Potable Reuse	$ 415.22	$ 1.27	I
Potable Reuse	$ 705.89	$ 2.17	J
On Farm	$ 253.38	$ 0.78	K
Groundwater	$ 304.46	$ 0.93	L
Advanced Conservation	$ 112.47	$ 0.35	M
Conveyance System	$ 120.68	$ 0.34	N

Attachment A
Exhibit B Guidelines

Cost Analysis Guidelines from Exhibit B

From Exhibit B, Page 52
"4.2.9 Costs of Strategies
Each potentially feasible WMS evaluation performed by Planning Groups to meet needs will include the cost, quantity, environmental impacts, and water quality that is delivered and treated for end user requirements and shall be evaluated by each unique water supply source. If Planning Groups are unable to quantify costs, quantity, and water quality for a WMS, then the cost fields will be left blank and the WMS will be discussed in the report. An example of this could be brush control and weather modification. Only WMSs with water quantity and water quality quantified may be used in Regional Water Plans to meet needs within the planning area. Each WMS evaluation will include the cost of water delivered and treated for end user requirements, incorporating factors used to calculate infrastructure debt payments. Total capital costs and annual costs by decade to deliver treated water to the user, which include debt service, power, water purchase, and operation and maintenance shall be presented for each WMS evaluated. Calculation of debt service shall use the following parameters:
1. Length of debt service: Usually represented in 20 year terms with the terms never being longer than the life of the project, appropriate contract limits, or 40 years for reservoirs, or 35 years for state participation projects.
2. Level debt service is to be used, except for state participation, which would have the following parameters:
a) Defer interest payments in the following manner:
Year 1 - 100% of interest amount due that year,
Year 2 - 100%,
Year 3 - 80%,
Year 4 - 80%,
Year 5 - 70%,
Year 6 - 60%,
Year 7 - 45%,
Year 8 - 30%,
Year 9 - 15%.
b) Interest payments on remaining principal to begin in year 10 and continue for life of the loan.
c) Total interest deferred to be repaid in uniform amounts during years 13 through 19 as additional interest.
d) No principal paid until all deferred interest is repaid.
e) Level payment of interest and principal for years 20 through 35.
3. Interest rates would be 6 percent per year. Interest for State participation projects is simple interest.

WMS Project Costs
Cost elements to be included in the estimates are listed below:
A. Capital Costs

1. Construction Costs. Construction costs include those costs that would be expected to be obtained from qualified contractors bidding on a public works project. Updates of previous cost estimates to second quarter 2002 price levels and trending of unit costs should be performed using the Engineering News Record (ENR) Construction Cost Index. When presenting costs in report text, please note the basis of construction cost estimates. For example, footnote whether a cost estimate is an original calculation using standard unit costs (e.g. based on published *Means* construction unit costs) or if cost is based on previous reports, contractor quotes, or recent projects. Construction cost examples include:
a) Pump Stations
b) Pipelines
c) Intake Structures
d) Water Treatment Plants
e) Water Storage Tanks
f) Reservoirs
g) Well Fields
h) Relocation (e.g. roads, utilities)
i) Other Items
2. Other Capital Outlays. Other capital outlay costs include the costs for engineering, contingencies, financial, legal, administration, environmental permitting and mitigation, land, interest during construction, etc. These costs need to be added to the construction costs to obtain the total capital cost. Use the following guides, if applicable, for estimating these costs:
a) **Engineering (Design, Bidding and Construction Phase Services, Geotechnical, and Surveying), Legal, Financing, Bond Counsel, and Contingencies:** Engineering, contingencies, financial and legal services should be lumped together and estimated as 30 percent of total construction costs for pipeline projects and 35 percent for all other facilities (unless otherwise noted).
b) **Land and Easements:** Easement costs vary significantly with location and economic factors. Costs should include legal services, sales commissions, land appraisals, and surveys in the cost per acre used. Easement costs for pipelines should include a permanent easement plus a temporary construction easement plus rights to enter the easement for maintenance.
c) **Environmental – Studies & Mitigation (including Archeology – Studies, Mitigation, and Permitting):** Environmental and archeological studies and mitigation and permitting costs are generally estimated on an individual project basis using accessible information and qualified professionals judgement. In the case of reservoir projects, a preliminary estimate of mitigation costs can be based on acreage of inundation times the cost per acre to purchase an equal land area. For many potential future reservoir sites, estimated acres required for mitigation has been evaluated (see “A Natural Resource Survey for Proposed Reservoir Sites and Selected Stream Segments in Texas,” by TPWD and TWDB, 1991, Interagency Contract #1756). The cost can then be estimated using this mitigation acreage assessment which incorporates habitat value of the proposed inundated land.

d) **Interest During Construction:** Interest and debt service during construction are estimated assuming the total estimated project cost (excluding interest during construction) will be drawn down at a constant rate per month during the construction period. Interest during construction is the total of interest accrued at the end of the construction period using a 6 percent annual interest rate on total borrowed funds, less a 4 percent rate of return on investment of unspent funds.
e) **Purchased Water Cost (if applicable):** Purchased water cost, if applicable, should be shown if the alternative involves purchase of water rights.
B. Annual Costs
a) **Operations and Maintenance:** Operations and maintenance costs (O&M) (not including power costs for pumping) should be based on the quantity of water supplied. Unless project-specific data was accessible, annual O&M costs are calculated as 1.0 percent of the total estimated construction cost for pipelines, as 2.5 percent of total estimated construction costs for pump stations, and as 1.5 percent of total estimated construction costs for dams. These costs include labor and materials required to maintain the project and regular repair and/or replacement of equipment.
b) **Power Cost:** Power costs are calculated on an annual basis using calculated horsepower input and a power purchase cost of $0.06 per kWh. Power costs may be adjusted for local conditions.
c) **Purchased Water Cost (if applicable):** Purchased Water Cost, if applicable, should be shown if the alternative involves purchase of raw or treated water from an entity on an annual basis (e.g. lease of water rights).
d) **Debt Service:** Based on capital costs.

Discounted Present Value of Costs

In a separate accounting, total costs (including operating costs and debt payments) will be discounted and shown in terms of present value. Discounting reflects the time value of money. The dollar value of a cost that is incurred farther in the future is worth less in present terms than a cost incurred sooner. Thus, discounting allows a valid comparison of different projects where costs are incurred over different periods of time. The formula for calculating the present value of costs incurred in a given future year is:

$PV_t = Cost_t / (1 + R)^{t-2005}$

Where:
PV*t* = the present value (expressed in terms of the base year 2005) of the total annual cost incurred in a future year *t*

t = the future year in which the cost is to be incurred

Cost*t* = the actual value of the total annual cost to be incurred in year *t*

R = the 30-year real discount rate published annually by the U.S. Army Corps of Engineers. The rate used in calculating the present value of WMS costs will be that published in fiscal year 2004.

The total discounted present value (TDPV) for the WMS will be calculated as the sum of the present values of the total annual costs. Discounted values will be automatically calculated on the web-based database application forms and based on the annual costs for each WMS as reported by the Planning Group. Costs per acre-foot will be automatically calculated on the database forms using the reported data for costs and for acre-feet of supply realized."

Attachment B
Acquisition of Water Rights Through Purchase

EXAMPLE #1: Acquisition of Water Rights Through the Purchase of Irrigation Surface Water Rights Treated at a New Local Treatment Plant @ $1.52/gallon		
CONSTRUCTION CAPITAL COSTS:		
Intakes & Pump Stations	$	75,000
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)	$	1,520,000
Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	628,250
Land Acquisition & Easements (5%)	$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	17,950
Water Volume: *1120 acre-ft Purchased*		
WR Purchase Price *$2,000/acre-ft*	$	2,240,000.00
Other Project Costs Subtotal	***$***	***2,975,950***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)	$	220,659.75
Debt Service Water Rights (6% for 20 years)	$	195,293.41
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	45,920.00
Water Treatment Plant($.40/gallon)	$	146,000.00
***Assuming No Conveyance Loss*		
Annual Costs Subtotal		***$607,873.16***
Annual Cost of Water ($ per acre-foot yield)	$	542.74
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.67
*Conversion: gal/ac-ft = 325,851		

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #2: Acquisition of Water Rights Through the Purchase of Irrigation Surface Water Rights Treated at a New Local Treatment Plant @ $1.15/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
Construction Capital Costs Subtotal		***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
WR Purchase Price	*$2,000/acre-ft*	$	2,240,000.00
Other Project Costs Subtotal		***$***	***2,824,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Debt Service Water Rights (6% for 20 years)		$	195,293.41
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
Annual Costs Subtotal			***$562,388.98***
Annual Cost of Water ($ per acre-foot yield)		$	502.13
Annual Cost of Water ($ per 1,000 gallons yield)		$	1.54
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs.

EXAMPLE #3: Acquisition of Water Rights Through the Purchase of Irrigation Surface Water Rights Treated at a New Local Treatment Plant @ $1.52/gallon with 25% Conveyance Loss		
CONSTRUCTION CAPITAL COSTS:		
Intakes & Pump Stations	$	75,000
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)	$	1,520,000
Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	628,250
Land Acquisition & Easements (5%)	$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	17,950
Water Volume: *1120 acre-ft Purchased*		
WR Purchase Price *$2,000/acre-ft*	$	2,240,000.00
Other Project Costs Subtotal	***$***	***2,975,950***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)	$	220,659.75
Debt Service Water Rights (6% for 20 years)	$	195,293.41
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	45,920.00
Water Treatment Plant($.40/gallon)	$	146,000.00
***Assuming @25% Conveyance Loss*		
Annual Costs Subtotal		***$607,873.16***
Annual Cost of Water ($ per acre-foot yield)	$	723.66
Annual Cost of Water ($ per 1,000 gallons yield)	$	2.22
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered		

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #4: Acquisition of Water Rights Through the Purchase of Irrigation Surface Water Rights Treated at a New Local Treatment Plant @ $1.15/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
	Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
WR Purchase Price	*$2,000/acre-ft*	$	2,240,000.00
	Other Project Costs Subtotal	***$***	***2,824,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Debt Service Water Rights (6% for 20 years)		$	195,293.41
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming @25% Conveyance Loss*		
	Annual Costs Subtotal		***$562,388.98***
	Annual Cost of Water ($ per acre-foot yield)	$	669.51
	Annual Cost of Water ($ per 1,000 gallons yield)	$	2.05
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs.

Attachment C
Acquisition of Water Rights Through Urbanization

EXAMPLE #5: Acquisition of Water Rights Through Urbanization Treated at a New Local Treatment Plant @ $1.52/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
WR Purchase Price	*$2,000/acre-ft*	$	-
	Other Project Costs Subtotal	***$***	***735,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	220,659.75
Debt Service Water Rights (6% for 20 years)		$	-
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
	Annual Costs Subtotal		***$412,579.75***
	Annual Cost of Water ($ per acre-foot yield)	$	368.37
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.13
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #6: Acquisition of Water Rights Through Urbanization Treated at a New Local Treatment Plant @ $1.15/gallon		
CONSTRUCTION CAPITAL COSTS:		
Intakes & Pump Stations	$	75,000
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)	$	1,150,000
Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	498,750
Land Acquisition & Easements (5%)	$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	14,250
Water Volume: *1120 acre-ft Purchased*		
WR Purchase Price *$2,000/acre-ft*	$	-
Other Project Costs Subtotal	***$***	***584,250***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)	$	175,175.57
Debt Service Water Rights (6% for 20 years)	$	-
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	45,920.00
Water Treatment Plant($.40/gallon)	$	146,000.00
***Assuming No Conveyance Loss*		
Annual Costs Subtotal		***$367,095.57***
Annual Cost of Water ($ per acre-foot yield)	$	327.76
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.01
*Conversion: gal/ac-ft = 325,851		

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #7: Acquisition of Water Rights Through Urbanization Treated at a New Local Treatment Plant @ $1.52/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
WR Purchase Price	*$2,000/acre-ft*	$	-
	Other Project Costs Subtotal	***$***	***735,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	220,659.75
Debt Service Water Rights (6% for 20 years)		$	-
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming @25% Conveyance Loss*		
	Annual Costs Subtotal		***$412,579.75***
	Annual Cost of Water ($ per acre-foot yield)	$	491.90
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.51
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #8: Acquisition of Water Rights Through Urbanization Treated at a New Local Treatment Plant @ $1.15/gallon with 25% Conveyance Loss		
CONSTRUCTION CAPITAL COSTS:		
Intakes & Pump Stations	$	75,000
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)	$	1,150,000
Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	498,750
Land Acquisition & Easements (5%)	$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	14,250
Water Volume: *1120 acre-ft Purchased*		
WR Purchase Price *$2,000/acre-ft*	$	-
Other Project Costs Subtotal	***$***	***584,250***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)	$	175,175.57
Debt Service Water Rights (6% for 20 years)	$	-
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	45,920.00
Water Treatment Plant($.40/gallon)	$	146,000.00
***Assuming @25% Conveyance Loss*		
Annual Costs Subtotal		***$367,095.57***
Annual Cost of Water ($ per acre-foot yield)	$	437.02
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.34
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered		

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs.

Attachment D
Acquisition of Water Rights Through Contract

EXAMPLE #9A: Acquisition of Water Rights Through Surface Water Under Contract @ $1,000/acre-ft Treated at a New Local Treatment Plant @ $1.52/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$1,000/acre-ft*	$	1,120,000.00
	Other Project Costs Subtotal	***$***	***735,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)			$220,659.75
Annual Contract Price			$97,646.70
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
	Annual Costs Subtotal		***$510,226.46***
	Annual Cost of Water ($ per acre-foot yield)	$	455.56
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.40
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #9B: Acquisition of Water Rights Through Surface Water Under Contract @ $750/acre-ft Treated at a New Local Treatment Plant @ $1.52/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$750/acre-ft*	$	840,000.00
	Other Project Costs Subtotal	***$***	***1,575,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	220,659.75
Annual Contract Price			$73,235.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
	Annual Costs Subtotal		***$485,814.78***
	Annual Cost of Water ($ per acre-foot yield)	$	433.76
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.33
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #9C: Acquisition of Water Rights Through Surface Water Under Contract @ $900/acre-ft Treated at a New Local Treatment Plant @ $1.52/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$900/acre-ft*	$	1,008,000.00
	Other Project Costs Subtotal	***$***	***1,743,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	220,659.75
Annual Contract Price			$87,882.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
	Annual Costs Subtotal		***$500,461.79***
	Annual Cost of Water ($ per acre-foot yield)	$	446.84
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.37
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate of $.40 to treat a gallon of water. It is a line item under O&M Costs. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #10A:Acquisition of Water Rights Through Surface Water Under Contract @ $1,000/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
	Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$1,000/acre-ft*	$	1,120,000.00
	Other Project Costs Subtotal	***$***	***1,704,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$97,646.70
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
	Annual Costs Subtotal		***$464,742.27***
	Annual Cost of Water ($ per acre-foot yield)	$	414.95
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.27
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

EXAMPLE #10B:Acquisition of Water Rights Through Surface Water Under Contract @ $750/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
	Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$750/acre-ft*	$	840,000.00
	Other Project Costs Subtotal	***$***	***1,424,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$73,235.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
	Annual Costs Subtotal		***$440,330.60***
	Annual Cost of Water ($ per acre-foot yield)	$	393.15
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.21
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

EXAMPLE #10C:Acquisition of Water Rights Through Surface Water Under Contract @ $900/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
Construction Capital Costs Subtotal		***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$900/acre-ft*	$	1,008,000.00
Other Project Costs Subtotal		***$***	***1,592,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$87,882.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming No Conveyance Loss*		
Annual Costs Subtotal			***$454,977.60***
Annual Cost of Water ($ per acre-foot yield)		$	406.23
Annual Cost of Water ($ per 1,000 gallons yield)		$	1.25
*Conversion: gal/ac-ft = 325,851			

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

EXAMPLE #11A:Acquisition of Water Rights Through Surface Water Under Contract @ $1,000/acre-ft Treated at a New Local Treatment Plant @ $1.52/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$1,000/acre-ft*	$	1,120,000.00
	Other Project Costs Subtotal	***$***	***1,855,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	220,659.75
Annual Contract Price			$97,646.70
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming @25% Conveyance Loss*		
	Annual Costs Subtotal		***$510,226.46***
	Annual Cost of Water ($ per acre-foot yield)	$	608.32
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.87
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #11B:Acquisition of Water Rights Through Surface Water Under Contract @ $750/acre-ft Treated at a New Local Treatment Plant @ $1.52/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)		$	1,520,000
	Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	628,250
Land Acquisition & Easements (5%)		$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	17,950
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$750/acre-ft*	$	840,000.00
	Other Project Costs Subtotal	***$***	***1,575,950***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	220,659.75
Annual Contract Price			$73,235.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming @25% Conveyance Loss*		
	Annual Costs Subtotal		***$485,814.78***
	Annual Cost of Water ($ per acre-foot yield)	$	579.21
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.78
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #11C:Acquisition of Water Rights Through Surface Water Under Contract @ $900/acre-ft Treated at a New Local Treatment Plant @ $1.52/gallon with 25% Conveyance Loss		
CONSTRUCTION CAPITAL COSTS:		
Intakes & Pump Stations	$	75,000
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (1 MGD@ $1.52/gallon)	$	1,520,000
Construction Capital Costs Subtotal	***$***	***1,795,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	628,250
Land Acquisition & Easements (5%)	$	89,750
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	17,950
Water Volume: *1120 acre-ft Purchased*		
Contract Price: *$900/acre-ft*	$	1,008,000.00
Other Project Costs Subtotal	***$***	***1,743,950***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)	$	220,659.75
Annual Contract Price		$87,882.03
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	45,920.00
Water Treatment Plant($.40/gallon)	$	146,000.00
***Assuming @25% Conveyance Loss*		
Annual Costs Subtotal		***$500,461.79***
Annual Cost of Water ($ per acre-foot yield)	$	596.68
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.83
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered		

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water. Electrical costs are a line item in the construction cost breakdown located in Attachment E.

EXAMPLE #12A: Acquisition of Water Rights Through Surface Water Under Contract @ $1,000/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
Construction Capital Costs Subtotal		***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$1,000/acre-ft*	$	1,120,000.00
Other Project Costs Subtotal		***$***	***1,704,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$97,646.70
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
***Assuming @25% Conveyance Loss*			
Annual Costs Subtotal			***$464,742.27***
Annual Cost of Water ($ per acre-foot yield)		$	553.26
Annual Cost of Water ($ per 1,000 gallons yield)		$	1.70
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

EXAMPLE #12A: Acquisition of Water Rights Through Surface Water Under Contract @ $1,000/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
	Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$1,000/acre-ft*	$	1,120,000.00
	Other Project Costs Subtotal	***$***	***1,704,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$97,646.70
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming @25% Conveyance Loss*		
	Annual Costs Subtotal		***$464,742.27***
	Annual Cost of Water ($ per acre-foot yield)	$	553.26
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.70
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

EXAMPLE #12B: Acquisition of Water Rights Through Surface Water Under Contract @ $750/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
	Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$750/acre-ft*	$	840,000.00
	Other Project Costs Subtotal	***$***	***1,424,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$73,235.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	*****Assuming @25% Conveyance Loss***		
	Annual Costs Subtotal		***$440,330.60***
	Annual Cost of Water ($ per acre-foot yield)	$	524.20
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.61
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

EXAMPLE #12C: Acquisition of Water Rights Through Surface Water Under Contract @ $900/acre-ft Treated at a New Local Treatment Plant @ $1.15/gallon with 25% Conveyance Loss			
CONSTRUCTION CAPITAL COSTS:			
Intakes & Pump Stations		$	75,000
Transmission Pipelines (Assumes 1 mile)		$	200,000
Water Treatment Plant (1 MGD@ $1.15/gallon)		$	1,150,000
	Construction Capital Costs Subtotal	***$***	***1,425,000***
PROJECT COSTS:			
Engineering, Legal Costs, Financing, & Contingencies (35%)		$	498,750
Land Acquisition & Easements (5%)		$	71,250
Environmental & Arch. Studies & Mitigation & Permitting (1%)		$	14,250
Water Volume:	*1120 acre-ft Purchased*		
Contract Price:	*$900/acre-ft*	$	1,008,000.00
	Other Project Costs Subtotal	***$***	***1,592,250***
ANNUAL COSTS:			
Debt Service Construction + Other (6% for 20 years)		$	175,175.57
Annual Contract Price			$87,882.03
Operation & Maintenance			
**Delivery Cost (average: $41/acre-foot)		$	45,920.00
Water Treatment Plant($.40/gallon)		$	146,000.00
	***Assuming @25% Conveyance Loss*		
	Annual Costs Subtotal		***$454,977.60***
	Annual Cost of Water ($ per acre-foot yield)	$	541.64
	Annual Cost of Water ($ per 1,000 gallons yield)	$	1.66
*Conversion: gal/ac-ft = 325,851 ** Prices reflects only 75% of the water being delivered			

*A conveyance loss factor was calculated in this cost breakdown due to the fact that the irrigators interviewed through this round of regional planning stated that conveyance loss should be a factor in calculating costs for water rights acquisition. 25% was the proposed factor that was used.

Power Costs were added in the annual water treatment estimate that it would cost $.40 to treat a gallon of water.

Attachment E

Research & Assumptions Made When Calculating Cost Analysis for the Acquisition of Water Rights Tables in Appendix B, C, & D

Purchase of Water Rights	
Purchase Cost	Annual Cost @ 6% for 20 Years
$ 2,000.00	$ 174.37
$ 2,100.00	$ 183.09
$ 1,960.00	$ 170.88
$ 2,020.00	$ 176.11

Examples of Purchase Costs
$ 1,960.00
$ 2,000.00
$ 2,020.00
$ 2,100.00

WMS Cost Analysis	
Strategy:	Acquisition of Water Rights

Costs	
Purchase of Water Rights:	**(Per acre-ft)**
Average	$2,000/acre-ft
Range	$1,960 - $2,100
Average (Financed @ 6% for 20 years)	176.11/acre-ft
Range (Financed @ 6% for 20 years)	$170.88 - $183.09

Pumping Cost for delivery of water to plant by irrigation district:	(Per 1000 gallons)
Average	$0.123
Range	$.085 - $.176
	(Per acre-ft)
Average	$41.26
Range	$27.69 - $57.35
This is the data from four examples of pumping costs by irrigation districts.	

The Estimate of $1.52/gallon & $1.81/gallon for the costs to be taken into consideration for a new treatment was referenced from this data from the City of San Benito.

City of San Benito Data			
New 10.0 MGD Water Treatment Plant			
Activity	**Phase 1 Costs**	**Phase 2 Costs**	**Total Costs**
Raw Water Intake Screens/Gates	$ 400,000	$ 50,000	$ 450,000
Raw Water Reservoir	$ 600,000	$ 200,000	$ 800,000
High Service Pump Station	$ 900,000	$ 100,000	$ 1,000,000
Raw Water Pump Station	$ 550,000	$ 100,000	$ 650,000
Flocculation/Sedimentation Basins	$ 2,200,000	$ 1,300,000	$ 3,500,000
Membrane Filtration Equipment	$ 2,100,000	$ 900,000	$ 3,000,000
Filter Building	$ 360,000	$ 90,000	$ 450,000
Chemical Storage/ Feed System	$ 420,000	$ 30,000	$ 450,000
Administrative/Lab/Control Building	$ 280,000	$ -	$ 280,000
Chemical Building	$ 170,000	$ 34,000	$ 204,000
Clearwell Tank	$ 850,000	$ -	$ 850,000
Recycle Pump Station	$ 120,000	$ 5,000	$ 125,000
Backwash Waste/ Sludge Lagoon	$ 336,000	$ 114,000	$ 450,000
Plant Piping & Valving	$ 1,317,000	$ 410,000	$ 1,727,000
Plant Electrical	$ 1,881,000	$ 587,000	$ 2,468,000
Site Grading & Seeding	$ 100,000	$ -	$ 100,000
Site Paving	$ 180,000	$ -	$ 180,000
Fencing	$ 74,700	$ -	$ 74,700
Plant Mobilization, Bonds, & Insurance(3%)	$ 391,000	$ 117,600	$ 508,600
Contingency (15%)	$ 1,984,455	$ 605,640	$ 2,590,095
	$ 15,214,155	$ 4,643,240	$ 19,857,395
Total Construction Costs	**$ 15,214,155**	**$ 4,643,240**	**$ 19,857,395**
Land Acquisition,20 acres @8,000/acre	$ 160,000	$ -	$ 160,000
Capital Cost for existing WTP upkeep	$ 500,000	$ -	$ 500,000
Preliminary Engineering	$ 228,212	$ 156,788	$ 385,000
Engineering Design Phase	$ 760,707	$ 781,893	$ 1,542,600
Engineering Construction Phase	$ 228,212	$ 156,788	$ 385,000
Construction Inspection	$ 155,000	$ 133,800	$ 288,800
Design Surveying	$ 30,000	$ 29,000	$ 59,000
O&M Manual	$ 30,000	$ 29,000	$ 59,000
Geotechniccal & Materials Testing	$ 155,000	$ 230,000	$ 385,000
Financial, Legal, & Insurance Costs (4%)	$ 608,566	$ 185,730	$ 794,296
	$ 2,855,697	$ 1,702,999	$ 4,558,696
Total Non-Construction Costs	**$ 2,855,697**	**$ 1,702,999**	**$ 4,558,696**
Total Project Cost	**$ 18,069,852**	**$ 6,346,239**	**$ 24,416,091**

*The Electrical Costs are included in this plant cost estimate provided to us by the City of San Benito.

Attachment F
Brownsville Weir

EXAMPLE #13: Brownsville Weir		
CONSTRUCTION CAPITAL COSTS:		
Weir & Reservoir*	$	25,953,000
Water Treatment Plant (35MGD)	$	29,750,000
Treated Water Storage	$	1,487,500
Construction Capital Costs Subtotal	***$***	***57,190,500***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	20,016,675
Land Acquisition & Easements (5%)	$	2,859,525
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	571,905
Firm Yield *20,640 acre-ft*		
Other Project Costs Subtotal	$	23,448,105.00
Total Project Costs	***$***	***80,638,605.00***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$7,030,441.05
Operation & Maintenance		
O&M WTP	$	2,975,000.00
O&M Weir & Reservoir	$	389,000.00
***Using Project Costs from the Last Round Regional Planning @ 6% for 20Yrs*		
Annual Costs Subtotal		***$10,394,441.05***
Annual Cost of Water ($ per acre-foot yield)	$	503.53
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.55
*Conversion: gal/ac-ft = 325,851		

Costs were based on the Technical Memo titled “Evaluation of Low Priority Strategies for the Rio Grande Regional Plan” by TC&B adopted for the last round of regional planning.

EXAMPLE #13B: Brownsville Weir		
CONSTRUCTION CAPITAL COSTS:		
Weir & Reservoir*	$	31,000,000
Water Treatment Plant (35MGD)	$	29,750,000
Treated Water Storage	$	1,487,500
Construction Capital Costs Subtotal	***$***	***62,237,500***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	21,783,125
Land Acquisition & Easements (5%)	$	3,111,875
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	622,375
Firm Yield *20,643 acre-ft*		
Other Project Costs Subtotal	$	25,517,375.00
Total Project Costs	***$***	***87,754,875.00***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$7,650,869.90
Operation & Maintenance		
O&M WTP	$	2,975,000.00
O&M Weir & Reservoir	$	465,000.00
***Using Project Costs from the Last Round Regional Planning @ 6% for 20Yrs*		
Annual Costs Subtotal		***$11,090,869.90***
Annual Cost of Water ($ per acre-foot yield)	$	537.27
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.65
*Conversion: gal/ac-ft = 325,851		

Note: The $31,000,000 Construction Capital Costs are the revised costs based on Present Cost. This is the cost estimate used for calculating the funding for this region for the Infrastructure Finance Report found in Chapter Nine of the Region M Regional Water Plan. Interest during construction is added to other project costs. The interest for this specific project came out to be $ 835,929.

Decadal Costs

WMS	Unit Cost ($)	Yield	2010	2020	2030	2040	2050	2060
Brownsville Weir and Reservoir	$537.27	20,643	$ 11,090,865	$11,090,865	$11,090,865	$ 11,090,865	$ 11,090,865	$11,090,865

*20,643 Acre-ft is a firm yield for this project

Attachment G
Seawater Desalination

EXAMPLE #14: Seawater Desalination		
CONSTRUCTION CAPITAL COSTS:		
Construction Costs	$	151,388,000
Construction Capital Costs Subtotal	***$***	***151,388,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	52,985,800
Land Acquisition & Easements (5%)	$	7,569,400
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	1,513,880
Interest During Construction	$	3,658,543.33
Total Project Costs	***$***	***65,727,623.33***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$18,929,129.43
Operation & Maintenance		
O&M Costs	$	11,776,000.00
Annual Costs Subtotal		***$30,705,129.43***
Annual Cost of Water ($ per acre-foot yield)	$	767.63
Annual Cost of Water ($ per 1,000 gallons yield)	$	2.36
*Conversion: gal/ac-ft = 325,851		

Costs were based on the Biennial Report on Seawater Desalination titled "The Future of Desalination in Texas, Volume 1" by TWDB published in December 2004.

Power Cost			
	Kilowatt- Hours	Cost Per Hour	Total Cost
Corpus Christi	112,391,661	$ 0.0650	$7,305,458.00
Brownsville	127,400,000	$ 0.0545	$6,943,000.00
Freeport	N/A	N/A	$3,162,200.00

Decadal Costs by WUG (Attachment P Provides Decadal Data)

WMS	Unit Cost ($)	Yield	2010	2020	2030	2040	2050	2060
Brownsville Seawater Desalination	$ 767.63	7,013	-	-	-	5,600	5,600	7,013
DECADAL COSTS			0	0	0	$ 4,298,728	$ 4,298,728	$ 5,383,389

WMS	Unit Cost ($)	Yield	2010	2020	2030	2040	2050	2060
Laguna Madre Water District Seawater Desalination	$ 767.63	7,013	100	100	118	424	796	864
DECADAL COSTS			$ 76,763	$ 76,763	$ 90,580	$ 325,475	$ 611,033	$ 663,232

Attachment H
Brackish Water Desalination

EXAMPLE #15: Brackish Water Desalination		
CONSTRUCTION CAPITAL COSTS:		
Construction Costs	$	2,192,712
Construction Capital Costs Subtotal	***$***	***2,192,712***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	767,449
Land Acquisition & Easements (5%)	$	109,636
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	21,927
Interest During Construction	$	55,731
Total Project Costs	***$***	***954,743.35***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$274,409.50
Operation & Maintenance		
Brine Disposal (Surface)	$	10,000.00
O&M Costs	$	281,765.00
Annual Costs Subtotal	***$***	***566,174.50***
Annual Cost of Water ($ per acre-foot yield)	$	505.51
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.55
*Conversion: gal/ac-ft = 325,851		

Brine disposal is site specific. There are several different forms of brine disposal. In this region surface disposal is the common form of disposal. Upfront costs for permitting should be taken into consideration in brine disposal but is not an annual Operation & Maintenance cost. The cost for this brine disposal was estimated at $10,000 annually. Initial costs were included in Environmental Studies which is a line item in Project Costs.

Power costs are added in the annual cost estimated for Operation & Maintenance. Close to 30% of the O&M costs are electrical and power costs due to the pumping and filtration.

Attachment I
Non-Potable Reuse

EXAMPLE #16: Non-Potable Reuse		
CONSTRUCTION CAPITAL COSTS:		
Treatment System	$	3,125,738
Transmission System (Assumes 1 mile)	$	200,000
Construction Capital Costs Subtotal	***$***	***3,325,738***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	1,164,008
Land Acquisition & Easements (5%)	$	166,287
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	33,257
Interest During Construction	$	118,102.00
Total Project Costs	***$***	***1,481,655***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$419,130.39
Operation & Maintenance		
O&M Costs	$	45,920.00
Treatment	$	146,000.00
Annual Costs Subtotal	***$***	***465,050.39***
Annual Cost of Water ($ per acre-foot yield)	$	415.22
Annual Cost of Water ($ per 1,000 gallons yield)	$	1.27
*Conversion: gal/ac-ft = 325,851		

Power costs are being taken into consideration under the Annual Costs of Treatment and Operation & Maintenance.

Attachment J
Potable Reuse

EXAMPLE #17: Potable Reuse		
CONSTRUCTION CAPITAL COSTS:		
Treatment System	$	5,758,970
Transmission System (Assumes 1 mile)	$	200,000
Construction Capital Costs Subtotal	***$***	***5,958,970***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	2,085,640
Land Acquisition & Easements (5%)	$	297,949
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	59,590
Interest During Construction	$	139,175.11
Total Project Costs	***$***	***2,582,353***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$744,671.45
Operation & Maintenance		
O&M Costs	$	45,920.00
Treatment	$	146,000.00
Annual Costs Subtotal	***$***	***790,591.45***
Annual Cost of Water ($ per acre-foot yield)	$	705.89
Annual Cost of Water ($ per 1,000 gallons yield)	$	2.17
*Conversion: gal/ac-ft = 325,851		

Power costs are being taken into consideration under the Annual Costs of Treatment and Operation & Maintenance.

Decadal Costs (One WUG chose Potable Reuse as a WMS)

WMS	Unit Cost ($)	Yield	2010	2020	2030	2040	2050	2060
Weslaco Potable Reuse	$ 705.89	1,120	1,120	1,120	1,120	1,120	1,120	1,120
DECADAL COSTS			$ 790,597	$ 790,597	$ 790,597	$ 790,597	$ 790,597	$ 790,597

Attachment K
Irrigation On-Farm Conservation

EXAMPLE #18: On-Farm Conservation		
CONSTRUCTION CAPITAL COSTS:		
Construction Costs	$	241,221,309
Construction Capital Costs Subtotal	***$***	***241,221,309***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	84,427,458
Land Acquisition & Easements (5%)	$	12,061,065
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	2,412,213
Interest During Construction	$	52,990.54
Total Project Costs	***$***	***98,953,727.23***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$29,658,009.83
Operation & Maintenance		
O&M Costs	$	39,776,678.00
Annual Costs Subtotal	***$***	***69,434,687.83***
Annual Cost of Water ($ per acre-foot yield)	$	253.38
Annual Cost of Water ($ per 1,000 gallons yield)	$	0.78
*Conversion: gal/ac-ft = 325,851		

Attachment L
Groundwater Supply

EXAMPLE #19A: Groundwater Supply at a New Local Treatment Plant @ $1.52/gallon		
CONSTRUCTION CAPITAL COSTS:		
Groundwater Wells & Pumping Equipment	$	2,957,000
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (9.5 MGD@ $1.52/gallon)	$	14,440,000
Construction Capital Costs Subtotal	***$***	***17,597,000***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	6,158,950
Land Acquisition & Easements (5%)	$	879,850
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	175,970
Other Project Costs Subtotal	***$***	***7,214,770***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$2,163,203.18
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	436,240.00
Electrical Service	$	400,000.00
Buildings & Sitework	$	240,000.00
***Assuming No Conveyance Loss*		
Annual Costs Subtotal		***$3,239,443.18***
Annual Cost of Water ($ per acre-foot yield)	$	304.46
Annual Cost of Water ($ per 1,000 gallons yield)	$	0.93
*Conversion: gal/ac-ft = 325,851	9.5 MGD = 10,640 ac-ft	

The pumps used to supply the groundwater use a lot of electrical power. This accounts for the annual estimate of $400,000 of power costs used for this strategy.

EXAMPLE #19B: Groundwater Supply with No Treatment		
CONSTRUCTION CAPITAL COSTS:		
Groundwater Wells & Pumping Equipment	$	2,872,762
Transmission Pipelines (Assumes 1 mile)	$	200,000
Water Treatment Plant (9.5 MGD@ $1.52/gallon)	$	-
Construction Capital Costs Subtotal	***$***	***3,072,762***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	1,075,467
Land Acquisition & Easements (5%)	$	153,638
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	30,728
Other Project Costs Subtotal	***$***	***1,259,832***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$377,735.29
Operation & Maintenance		
**Delivery Cost (average: $41/acre-foot)	$	436,240.00
Electrical Service	$	400,000.00
Buildings & Sitework	$	240,000.00
***Assuming No Conveyance Loss*		
Annual Costs Subtotal		***$1,453,975.29***
Annual Cost of Water ($ per acre-foot yield)	$	136.65
Annual Cost of Water ($ per 1,000 gallons yield)	$	0.42
*Conversion: gal/ac-ft = 325,851		

The pumps used to supply the groundwater use a lot of electrical power. This accounts for the annual estimate of $400,000 of power costs used for this strategy.

Attachment M
Advanced Conservation

EXAMPLE#20 Advanced Conservation		
CONSTRUCTION CAPITAL COSTS:		
School Education @ [$5/student (2000 population)]	***$***	***1,633,755***
Public Education @ [$5/person (2010 population)]	***$***	***4,743,621***
Costs	***$***	***6,377,376***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	2,232,082
Land Acquisition & Easements (5%)	$	318,869
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	63,774
Interest During Construction	***$***	***200,945***
Total Project Costs	***$***	***2,815,669.22***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$801,491.57
Annual Costs Subtotal		***$801,491.57***
Annual Cost of Water ($ per acre-foot yield)		$112.5
Annual Cost of Water ($ per 1,000 gallons yield)	$	0.35
*Conversion: gal/ac-ft = 325,851		

The savings was calculated taking the savings of public education, school education, and a higher efficiency clothes washer (2007) mandate savings.

There no applicable power costs for this Water Management Strategy.

Data Used to Calculate Advanced Conservation Strategy Cost

COUNTY	Population of School Age Children based on the 2003/ US Census	Prepackaged Contractor Extensive Features (@$35 student)	Education Entertainment Programs(@ $5 student)
Willacy	4707	$ 164,745.00	$ 23,535.00
Hidalgo	156053	$ 5,461,855.00	$ 780,265.00
Zapata	2908	$ 101,780.00	$ 14,540.00
Cameron	85186	$ 2,981,510.00	$ 425,930.00
Webb	49423	$ 1,729,805.00	$ 247,115.00
Jim Hogg	1250	$ 43,750.00	$ 6,250.00
Maverick	12751	$ 446,285.00	$ 63,755.00
Starr	14473	$ 506,555.00	$ 72,365.00
Total	326751	$ 11,436,285.00	$ 1,633,755.00

COUNTY	TWDB Projected Population of Region M for 2010	Cost of Public Education for 2010(@ $5 person)
Willacy	22,519	$ 67,557.00
Hidalgo	744,258	$ 2,232,774.00
Zapata	14,025	$ 42,075.00
Cameron	415,136	$ 1,245,408.00
Webb	257,647	$ 772,941.00
Jim Hogg	5,593	$ 16,779.00
Maverick	55,892	$ 167,676.00
Starr	66,137	$ 198,411.00
Total	1,581,207	$ 4,743,621.00

Attachment N
Conveyance System

Irrigation: Conveyance System		
CONSTRUCTION CAPITAL COSTS:		
Construction Costs		
Construction Capital Costs Subtotal	***$***	***20,020,648***
PROJECT COSTS:		
Engineering, Legal Costs, Financing, & Contingencies (35%)	$	7,007,227
Land Acquisition & Easements (5%)	$	1,001,032
Environmental & Arch. Studies & Mitigation & Permitting (1%)	$	200,206
Interest During Construction	$	2,018,748.67
Total Project Costs	***$***	***10,227,214.51***
ANNUAL COSTS:		
Debt Service Construction + Other (6% for 20 years)		$2,637,146.53
Operation & Maintenance		
O&M Costs	$	211,440.88
Annual Costs Subtotal	***$***	***2,848,587.41***
Annual Cost of Water ($ per acre-foot yield)	$	120.68
Annual Cost of Water ($ per 1,000 gallons yield)	$	0.37
*Conversion: gal/ac-ft = 325,851		

Attachment O
Samples of How Interest Was Calculated During Construction

This is how the debt service during construction for Brackish Desalination was calculated. The amount of $55,731 is shown in Attachment H.

One Year

	Deposit				**Interest earned**		
Month	2192712						
1	91363	91363	0.005	$456.82	$0.00	0.003333	$0.00
2	91363	182726	0.005	$913.63	-$91,363.00	0.003333	-$304.54
3	91363	274089	0.005	$1,370.45	-$182,726.00	0.003333	-$609.09
4	91363	365452	0.005	$1,827.26	-$274,089.00	0.003333	-$913.63
5	91363	456815	0.005	$2,284.08	-$365,452.00	0.003333	-$1,218.17
6	91363	548178	0.005	$2,740.89	-$456,815.00	0.003333	-$1,522.72
7	91363	639541	0.005	$3,197.71	-$548,178.00	0.003333	-$1,827.26
8	91363	730904	0.005	$3,654.52	-$639,541.00	0.003333	-$2,131.80
9	91363	822267	0.005	$4,111.34	-$730,904.00	0.003333	-$2,436.35
10	91363	913630	0.005	$4,568.15	-$822,267.00	0.003333	-$2,740.89
11	91363	1004993	0.005	$5,024.97	-$913,630.00	0.003333	-$3,045.43
12	91363	1096356	0.005	$5,481.78	-$1,004,993.00	0.003333	-$3,349.98
				$35,631.57			-$20,099.86
					Net Interest during const.		$55,731.43

55731.43

This is how the debt service during construction for the Brownsville Weir was calculated. The amount of $835,928.81 is shown in Attachment F.

One Year

	Deposit				**Interest earned**		
Month	31000000						
1	1291667	1291667	0.005	$6,458.33	-$1,200,303.67	0.003333	-$4,001.01
2	1291667	2583333	0.005	$12,916.67	-$2,491,970.33	0.003333	-$8,306.57
3	1291667	3875000	0.005	$19,375.00	-$3,783,637.00	0.003333	-$12,612.12
4	1291667	5166667	0.005	$25,833.33	-$5,075,303.67	0.003333	-$16,917.68
5	1291667	6458333	0.005	$32,291.67	-$6,366,970.33	0.003333	-$21,223.23
6	1291667	7750000	0.005	$38,750.00	-$7,658,637.00	0.003333	-$25,528.79
7	1291667	9041667	0.005	$45,208.33	-$8,950,303.67	0.003333	-$29,834.35
8	1291667	10333333	0.005	$51,666.67	-$10,241,970.33	0.003333	-$34,139.90
9	1291667	11625000	0.005	$58,125.00	-$11,533,637.00	0.003333	-$38,445.46
10	1291667	12916667	0.005	$64,583.33	-$12,825,303.67	0.003333	-$42,751.01
11	1291667	14208333	0.005	$71,041.67	-$14,116,970.33	0.003333	-$47,056.57
12	1291667	15500000	0.005	$77,500.00	-$15,408,637.00	0.003333	-$51,362.12
				$503,750.00			-$332,178.81
					Net Interest during const.		$835,928.81

Attachment P
Decadal Costs for Region M Yields

WMS	Yield (AF/yr)	Unit Cost ($)	2010	2020	2030	2040	2050	2060
Additional Groundwater	29824	$ 304.46	$ 9,080,215.04	$ 9,080,215.04	$ 9,080,215.04	$ 9,080,215.04	$ 9,080,215.04	$ 9,080,215.04
Advanced Water Conservation Measures	19009	$ 112.47	$ 2,137,942.23	$ 2,137,942.23	$ 2,137,942.23	$ 2,137,942.23	$ 2,137,942.23	$ 2,137,942.23
Non-Potable Water Re-use	30841	$ 415.22	$ 12,805,800.02	$ 12,805,800.02	$ 12,805,800.02	$ 12,805,800.02	$ 12,805,800.02	$ 12,805,800.02
Potable Water Re-use	1120	$ 705.89	$ 790,596.80	$ 790,596.80	$ 790,596.80	$ 790,596.80	$ 790,596.80	$ 790,596.80
Brownsville Weir and Reservoir	20643	$ 537.27	$ 11,090,864.61	$ 11,090,864.61	$ 11,090,864.61	$ 11,090,864.61	$ 11,090,864.61	$ 11,090,864.61
Acquisition of Water Rights:								
Purchase	143944	$ 542.74	$ 78,124,166.56	$ 78,124,166.56	$ 78,124,166.56	$ 78,124,166.56	$ 78,124,166.56	$ 78,124,166.56
Urbanization	15245	$ 368.37	$ 5,615,800.65	$ 5,615,800.65	$ 5,615,800.65	$ 5,615,800.65	$ 5,615,800.65	$ 5,615,800.65
Contract	4577	$ 455.56	$ 2,085,098.12	$ 2,085,098.12	$ 2,085,098.12	$ 2,085,098.12	$ 2,085,098.12	$ 2,085,098.12
Desalination:								
Brackish Groundwater Desalination	69832	$ 505.51	$ 35,300,774.32	$ 35,300,774.32	$ 35,300,774.32	$ 35,300,774.32	$ 35,300,774.32	$ 35,300,774.32
Seawater Desalination	7902	$ 767.63	$ 6,065,812.26	$ 6,065,812.26	$ 6,065,812.26	$ 6,065,812.26	$ 6,065,812.26	$ 6,065,812.26
Totals:	342937	$ 4,715.12	$163,097,070.61	$ 163,097,070.61	$ 163,097,070.61	$ 163,097,070.61	$ 163,097,070.61	$ 163,097,070.61

*This is table is decadal at a set yield. This reflects Municipal Yields for Region M.

Socioeconomic Impacts of Unmet Water Needs in the Rio Grande Water Planning Area

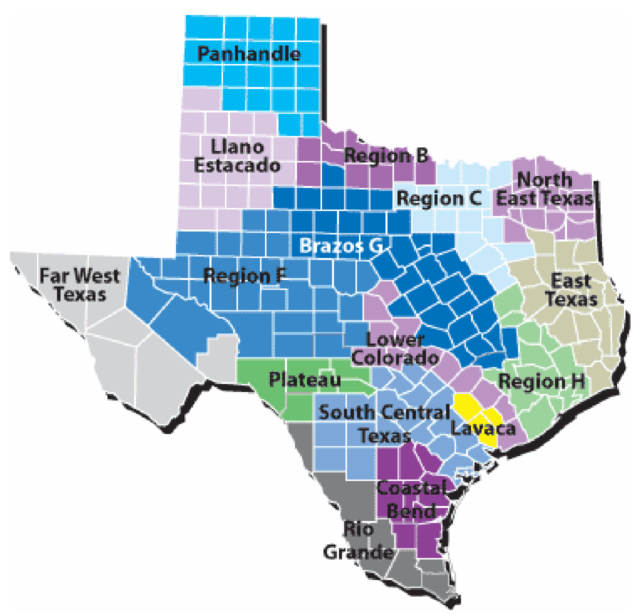
Prepared by:

Stuart Norvell and Kevin Kluge of The Texas Water Development Board's Office of Water Resources Planning

Prepared in support of the:

Rio Grande Water Planning Group and the 2006 Texas State Water Plan

May 2005 (revised September 2005)



Tables

Executive Summary

Background

Water shortages due to severe drought combined with infrastructure limitations would likely curtail or eliminate economic activity in business and industries heavily reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on business and industry, but they might also bias corporate decision makers against plant expansion or plant location in Texas. From a societal perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Section 357.7(4) of the rules for implementing Texas Senate Bill 1 requires regional water planning groups to evaluate the social and economic impacts of projected water shortages (i.e., “unmet water needs”) as part of the planning process. The rules contain provisions that direct the Texas Water Development Board (TWDB) to provide technical assistance to complete socioeconomic impact assessments. In response to requests from regional planning groups, staff of the TWDB’s Office of Water Resources Planning designed and conducted analyses to evaluate socioeconomic impacts of unmet water needs.

Overview of Methodology

Two components make up the overall approach to this study: 1) an economic impact module and 2) a social impact module. Economic analysis addresses potential impacts of unmet water needs including effects on residential water consumers and losses to regional economies stemming from reductions in economic output for agricultural, industrial and commercial water uses. Impacts to agriculture, industry and commercial enterprises were estimated using regional “input-output” models commonly used by researchers to estimate how reductions in business activity might affect a given economy. Estimated impacts are *independent* and distinct “what if” scenarios for a given point in time (i.e., 2010, 2020, 2030, 2040, 2050 and 2060). Reported figures are scenarios that illustrate what could happen in a given year if: 1) water supply infrastructure and/or water management strategies do not change through time, 2) the drought of record recurs. Details regarding the methodology and assumptions for individual water use categories (i.e., municipal consumers including residential and commercial water users, manufacturing, steam-electric, mining, and agriculture) are in the main body of the report.

The social component focuses on demographic effects including changes in population and school enrollment. Methods are based on population projection models developed by the TWDB for regional and state water planning. With the assistance of the Texas State Data Center, TWDB staff modified these models and applied them for use here. Basically, the social impact module incorporates results from the economic impact module and assesses how changes in a region’s economy due to water shortages could affect patterns of migration in a region.

Summary of Results

Table E-1 and Figure E-1 summarize estimated economic impacts. Variables shown include:[1]

- **sales** - economic output measured by sales revenue;
- **jobs** - number of full and part-time jobs required by a given industry including self-employment;
- **regional income** - total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments for the region; and
- **business taxes** - sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include any type of income tax).

If drought of record conditions return and water supplies are not developed, study results indicate that the Region M Water Planning Area would suffer significant losses. If such conditions occurred 2010 lost income to residents in the region could total $186 million with associated job losses as high 4,625. State and local governments could lose nearly $6 million in tax receipts. If such conditions occurred in 2060, income losses could run $2,044 million, and job losses could be as high as 27,760. Nearly $77 million worth of state and local taxes would be lost. Reported figures are probably conservative because they are based on estimated costs for a single year; but in much of Texas, the drought of record lasted several years. For example, in 2030 models indicate that shortages would cost residents and businesses in the region $893 million in lost income. Thus, if shortages lasted for three years total losses related to unmet needs could easily approach $2,680 million.

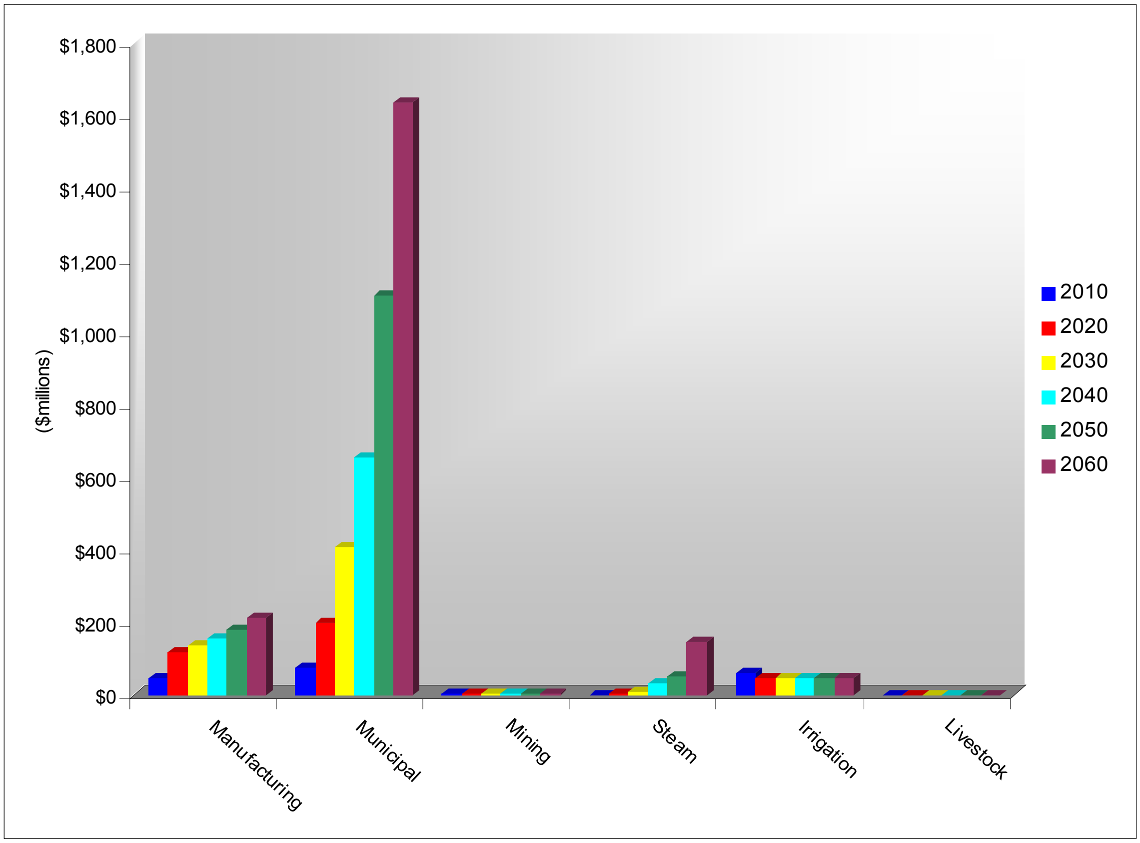
Table E-1: Annual Economic Impacts of Unmet Water Needs
(years, 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Income ($millions)	Jobs	State and Local Taxes ($millions)
2010	$367.98	$186.14	4,625	$6.20
2020	$621.86	$366.28	6,205	$10.09
2030	$1,105.68	$602.26	9,475	$18.60
2040	$1,136.76	$893.15	12,380	$28.24
2050	$1,598.58	$1,383.05	18,990	$44.98
2060	$2,257.03	$2,044.10	27,760	$76.96

Source: Texas Water Development Board, Office of Water Resources Planning

[1] When summed to a regional level, total sales across all sectors are not a good measure of economic prosperity because they include sales to other industries for further processing. For example, a farmer sells rice to a rice mill, which the rice mill processes and sells it to another consumer. Both transactions are counted in an input-output model. Thus, total sales "double count." Regional income plus business taxes are more suitable because they are a better measure of net economic returns.

Figure E-1: Distribution of Lost Income by Water Use Category
(years: 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)



Source: Texas Water Development Board Office of Water Resources Planning

Table E-2 shows potential losses in population and school enrollment. Changes in population stem directly from the number of lost jobs estimated as part of the economic impact module. In other words, many – but not all - people would likely relocate due to a job loss and some have families with school age children. Section 1.3 in the main body of the report discusses methodology in detail.

Table E-2: Estimated Regional Social Impacts of Unmet Water Needs
(years, 2010, 2020, 2030, 2040, 2050 and 2060)

Year	Population Losses	Declines in School Enrollment
2010	12,150	3,160
2020	16,500	4,280
2030	19,070	4,950
2040	24,770	6,420
2050	34,650	8,980
2060	53,160	13,790

Source: Based on models developed by the Texas Water Development Board, Office of Water Resources Planning and the Texas State Data Center.

Introduction

Texas is one the nation's fastest growing states. From 1950 to 2000, population in the state grew from about 8 million to nearly 21 million. By the year 2050, the total number of people living in Texas is expected to reach 40 million. Rapid growth combined with Texas' susceptibility to severe drought makes water supply a crucial issue. If water infrastructure and water management strategies are not improved, Texas could face serious social, economic and environmental consequences - not only in our large metropolitan cities, but also on our farms and rural areas.

Water shortages due to severe drought combined with infrastructure limitations would likely curtail or eliminate economic activity in business and industries heavily reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on business and industry, but they might also bias corporate decision makers against plant expansion or plant location in Texas. From a societal perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Section 357.7(4) of the rules for implementing Texas Senate Bill 1 requires regional water planning groups to evaluate the social and economic impacts of unmet water needs as part of the planning process. The rules contain provisions that direct the Texas Water Development Board (TWDB) to provide technical assistance to complete socioeconomic impact analyses. In response to requests from regional planning groups, TWDB staff designed and conducted required studies. The following document prepared by the TWDB's Office of Water Resources Planning summarizes analysis and results for the Region H Water Planning Area. Section 1 provides an overview of concepts and methodologies used in the study. Sections 2 and 3 provide detailed information and analyses for each water use category employed in the planning process (i.e., irrigation, livestock, municipal, manufacturing, mining and steam-electric).

1. Overview of Terms and Methodology

Section 1 provides a general overview of how economic and social impacts were measured. In addition, it summarizes important clarifications, assumptions and limitations of the study.

1.1 Measuring Economic Impacts

Economic analysis as it relates to water resources planning generally falls into two broad areas. Supply side analysis focuses on costs and alternatives of developing new water supplies or implementing programs that provide additional water from current supplies. Demand side analysis concentrates on impacts and benefits of providing water to people, businesses and the environment. Analysis in this report focuses strictly on demand side impacts. Specifically, it addresses the potential economic impacts of unmet water needs including: 1) losses to regional economies stemming from reductions in economic output, and 2) costs to residential water consumers associated with implementing emergency water procurement and conservation programs.

1.1.1 Impacts to Agriculture, Business and Industry

As mentioned earlier, severe water shortages would likely affect the ability of business and industry to operate resulting in lost output, which would adversely affect the regional economy. A variety tools are available to estimate such impacts, but by far, the most widely used today are input-output models (IO models) combined with social accounting matrices (SAMs). Referred to as IO/SAM models, these tools formed the basis for estimating economic impacts for agriculture (irrigation and livestock water uses) and industry (manufacturing, mining, steam-electric and commercial business activity for municipal water uses).

Basically, an IO/SAM model is an accounting framework that traces spending and consumption between different economic sectors including businesses, households, government and "foreign" economies in the form of exports and imports. As an example, Table 1 shows a highly aggregated segment of an IO/SAM model that focuses on key agricultural sectors in a local economy. The table contains transactions data for three agricultural sectors (cattle ranchers, dairies and alfalfa farms). Rows in Table 1 reflect sales from each sector to other local industries and institutions including households, government and consumers outside of the region in the form of exports. Columns in the table show purchases by each sector in the same fashion. For instance, the dairy industry buys $11.62 million worth of goods and services needed to produce milk. Local alfalfa farmers provide $2.11 million worth of hay and local households provide about $1.03 million worth of labor. Dairies import $4.17 million worth of inputs and pay $2.61 million in taxes and profits. Total economic activity in the region amounts to about $807.45 million. The entire table is like an accounting balance sheet where total sales equal total purchases.

Table 1: Example of a County-level Transaction and Social Accounting Matrix for Agricultural Sectors ($millions)

Sectors	Cattle	Dairy	Alfalfa	All other Industries	Taxes, govt. & profits	Households	Exports	Total
Cattle	$3.10	$0.01	$0.00	$0.03	$0.02	$0.06	$10.76	$13.98
Dairy	$0.07	$0.13	$0.00	$0.25	$0.01	$0.00	$11.14	$11.60
Alfalfa	$0.00	$2.11	$0.00	$0.01	$0.02	$0.01	$10.38	$12.53
Other industries	$2.20	$1.56	$2.90	$50.02	$70.64	$66.03	$48.48	$241.83
Taxes, govt. & profits	$2.37	$2.61	$5.10	$77.42	$0.23	$49.43	$83.29	$220.45
Households	$0.82	$1.03	$1.38	$50.94	$45.36	$7.13	$14.64	$121.30
Imports	$5.41	$4.17	$3.16	$63.32	$104.17	$5.53	$0.00	$185.76
Total	$13.97	$11.62	$12.54	$241.99	$220.45	$128.19	$178.69	$807.45

* Columns contain purchases and rows represent sales. Source: Adapted from Harris, T.R., Narayanan, R., Englin, J.E., MacDiarmid, T.R., Stoddard, S.W. and Reid, M.E. "*Economic Linkages of Churchill County*." University of Nevada Reno. May 1993.

To understand how an IO/SAM model works, first visualize that $1 of additional sales of milk is injected into the dairy industry in Table 1. For every $1 the dairies receive in revenue, they spend 18 cents on alfalfa to feed their cows; nine cents is paid to households who provide farm labor, and another 13 cents goes to the category "other industries" to buy items such as machinery, fuel, transportation, accounting services etc. Nearly 22 cents is paid out in the form of profits (i.e., returns to dairy owners) and taxes/fees to local, state and federal government. The value of the initial $1 of revenue in the dairy sector is referred to as a first-round or **direct effect.**

As the name implies, first-round or direct effects are only part of the story. In the example above, alfalfa farmers must make 18 cents worth of hay to supply the increased demand for their product. To do so, they purchase their own inputs, and thus, they spend part of the original 18 cents that they received from the dairies on firms that support their own operations. For example, 12 cents is spent on fertilizers and other chemicals needed to grow alfalfa. The fertilizer industry in turn would take these 12 cents and spend them on inputs in its production process and so on. The sum of all re-spending is referred to as the **indirect effect** of an initial increase in output in the dairy sector.

While direct and indirect impacts capture how industries respond to a change, **induced impacts** measure the behavior of the labor force. As demand for production increases, employees in base industries and supporting industries will have to work more; or alternatively, businesses will have to hire more people. As employment increases, household spending rises. Thus, seemingly unrelated businesses such as video stores, supermarkets and car dealers also feel the effects of an initial change.

Collectively, indirect and induced effects are referred to as **secondary impacts**. In their entirety, all of the above changes (direct and secondary) are referred to as **total economic impacts**. By nature, total impacts are greater than initial changes because of secondary effects. The magnitude of the increase is what is popularly termed a multiplier effect. Input-output models generate numerical multipliers that estimate indirect and induced effects.

In an IO/SAM model impacts stem from changes in output measured by sales revenue that in turn come from changes in consumer demand. In the case of water shortages, one is not assuming a change in demand, but rather a supply shock – in this case severe drought. Demand for a product such as corn has not necessarily changed during a drought. However, farmers in question lack a crucial input (i.e., irrigation water) for which there is no *short-term* substitute. Without irrigation, she cannot grow irrigated crops. As a result, her cash flows decline or cease all together depending upon the severity of the situation. As cash flows dwindle, the farmer's income falls, and she has to reduce expenditures on farm inputs such as labor. Lower revenues not only affect her operation and her employees directly, but they also indirectly affect businesses who sell her inputs such as fuel, chemicals, seeds, consultant services, fertilizer etc.

The methodology used to estimate regional economic impacts consists of three steps: 1) develop IO/SAM models for each county in the region and for the region as whole, 2) estimate direct impacts to economic sectors resulting from water shortages, and 3) calculate total economic impacts (i.e., direct plus secondary effects).

Step 1*: Generate IO/SAM Models and Develop Economic Baseline*

IO/SAM models were estimated using propriety software known as IMPLAN PRO™ (Impact for Planning Analysis). IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.[2] Using IMPLAN software and data, transaction tables conceptually similar to the one discussed previously (see Table 1 on page 7) were estimated for

[2]The basic IMPLAN database consists of national level technology matrices based on the Benchmark Input-Output Accounts generated the U.S. Bureau of Economic Analysis and estimates of final demand, final payments, industry output and employment for various economic sectors. IMPLAN's regional data (i.e. states, a counties or groups of counties within a state) are divided into two basic categories: 1) data on an industry basis including value-added, output and employment and 2) data on a commodity basis including final demands and institutional sales. State-level data are balanced to the national totals using a matrix ratio allocation system and county data are balanced to state totals. In other words, much of the data in IMPLAN is based on a national average for all industries.

each county in the region and for the region as a whole. Each transaction table contains 528 economic sectors and allows one to estimate a variety of economic statistics including:

- **total sales -** total production measured by sales revenues;
- **intermediate sales -** sales to other businesses and industry within a given region;
- **final sales** – sales to end users in a region and exports out of a region;
- **employment -** number of full and part-time jobs (annual average) required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include income taxes).

TWDB analysts developed an economic baseline containing each of the above variables using year 2000 data. Since the planning horizon extends through 2060, economic variables in the baseline were allowed to change in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Projections for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category. Monetary impacts in future years are reported in year 2000 dollars.

It is important to stress that employment, income and business taxes are the most useful variables when comparing the relative contribution of an economic sector to a regional economy. Total sales as reported in IO/SAM models are less desirable and can be misleading because they include sales to other industries in the region for use in the production of other goods. For example, if a mill buys grain from local farmers and uses it to produce feed, sales of both the processed feed and raw corn are counted as “output” in an IO model. Thus, total sales double-count or overstate the true economic value of goods and services produced in an economy. They are not consistent with commonly used measures of output such as Gross National Product (GNP), which counts only final sales.

Another important distinction relates to terminology. Throughout this report, the term *sector* refers to economic subdivisions used in the IMPLAN database and resultant input-output models (528 individual sectors based on Standard Industrial Classification Codes). In contrast, the phrase *water use category* refers to water user groups employed in state and regional water planning including irrigation, livestock, mining, municipal, manufacturing and steam electric. All sectors in the IMPLAN database were assigned to a specific water use category (see Attachment A of this report).

Step 2: *Estimate Direct Economic Impacts of Water Shortages*

As mentioned above, direct impacts accrue to immediate businesses and industries that rely on water. Without water industrial processes could suffer. However, output responses would likely vary depending upon the severity of a shortage. A small shortage relative to total water use may have a nominal effect, but as shortages became more critical, effects on productive capacity would increase.

For example, farmers facing small shortages might fallow marginally productive acreage to save water for more valuable crops. Livestock producers might employ emergency culling strategies, or they may consider hauling water by truck to fill stock tanks. In the case of manufacturing, a good example occurred in the summer of 1999 when Toyota Motor Manufacturing experienced water shortages at a facility near Georgetown, Kentucky. As water levels in the Kentucky River fell to historic lows due to drought, plant managers sought ways to curtail water use such as reducing rinse operations to a bare minimum and recycling water by funneling it from paint shops to boilers. They even considered trucking in water at a cost of 10 times what they were paying. Fortunately, rains at the end of the summer restored river levels, and Toyota managed to implement cutbacks without affecting production. But it was a close call. If rains had not replenished the river, shortages could have severely reduced output.[3]

Note that the efforts described above are not planned programmatic or long-term operational changes. They are emergency measures that individuals might pursue to alleviate what they consider a temporary condition. Thus, they are not characteristic of long-term management strategies designed to ensure more dependable water supplies such as capital investments in conservation technology or development of new water supplies.

To account for uncertainty regarding the relative magnitude of impacts to farm and business operations, the following analysis employs the concept of elasticity. Elasticity is a number that shows how a change in one variable will affect another. In this case, it measures the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, an elasticity of 1.0 indicates that a 1.0 percent reduction in water availability would result in a 1.0 percent reduction in economic output. An elasticity of 0.50 would indicate that for every 1.0 percent of unavailable water, output is reduced by 0.50 percent and so on. Output elasticities used in this study are:[4]

- if unmet water needs are 0 to 5 percent of total water demand, no corresponding reduction in output is assumed;
- if water shortages are 5 to 30 percent of total water demand, for every 1.0 one percent of unmet need, there is a corresponding 0.25 percent reduction in output;
- if water shortages are 30 to 50 percent of total water demand, for every 1.0 one percent of unmet need, there is a corresponding 0.50 percent reduction in output; and
- if water shortages are greater than 50 percent of total water demand, for every 1.0 one percent of unmet need, there is a corresponding 1.0 percent (i.e., a proportional reduction).

Once output responses to water shortages were estimated, direct impacts to total sales, employment, regional income and business taxes were derived using regional level economic multipliers estimating using IO/SAM models. When calculating direct effects for the municipal, steam electric, manufacturing and livestock water use categories, sales to final demand were applied to avoid double counting impacts. The formula for a given IMPLAN sector is:

$$D_{i,t} = Q_{i,t} *_{,} S_{i,t} * E_Q * RFD_i * DM_{i(Q, L, I, T)}$$

where:

[3] See, Royal, W. "*High And Dry - Industrial Centers Face Water Shortages*." in Industry Week, Sept, 2000.

[4] Elasticities are based on one of the few empirical studies that analyze potential relationships between economic output and water shortages in the United States. The study, conducted in California, showed that a significant number of industries would suffer reduced output during water shortages. Using a survey based approach researchers posed two scenarios to different industries. In the first scenario, they asked how a 15 percent cutback in water supply lasting one year would affect operations. In the second scenario, they asked how a 30 percent reduction lasting one year would affect plant operations. In the case of a 15 percent shortage, reported output elasticities ranged from 0.00 to 0.76 with an average value of 0.25. For a 30 percent shortage, elasticities ranged from 0.00 to 1.39 with average of 0.47. For further information, see, California Urban Water Agencies, "*Cost of Industrial Water Shortages*." Prepared by Spectrum Economics, Inc. November, 1991.

$D_{i,t}$ = direct economic impact to sector *i* in period *t*

$Q_{i,t}$ = total sales for sector *i* in period *t* in an affected county

$RFD_{i,}$ = ratio of final demand to total sales for sector *i* for a given region

$S_{i,t}$ = water shortage as percentage of total water use in period *t*

E_Q = elasticity of output and water use

$DM_{i(L, I, T)}$ = direct output multiplier coefficients for labor (L), income (I) and taxes (T) for sector *i*.

Direct impacts to irrigation and mining are based upon the same formula; however, total sales as opposed to final sales were used. To avoid double counting, secondary impacts in sectors other than irrigation and mining (e.g., manufacturing) were reduced by an amount equal to or less than direct losses to irrigation and mining. In addition, in some instances closely linked sectors were moved from one water use category to another. For example, although meat packers and rice mills are technically manufacturers, in some regions they were reclassified as either livestock or irrigation. All direct effects were estimated at the county level and then summed to arrive at a regional figure. See Section 2 of this report for additional discussion regarding methodology and caveats used when estimating direct impacts for each water use category.

Step 3: *Estimate Secondary and Total Economic Impacts of Water Shortages*

As noted earlier, the effects of reduced output would extend well beyond sectors directly affected. Secondary impacts were derived using the same formula used to estimate direct impacts; however, regional level *indirect* and *induced* multiplier coefficients were applied and only final sales were multiplied.

1.1.2 Impacts Associated with Domestic Water Uses

IO/SAM models are not well suited for measuring impacts of shortages for domestic uses, which make up the majority of the municipal category.[5] To estimate impacts associated with domestic uses, municipal water demand and thus needs were subdivided into two categories – residential and commercial. Residential water is considered “domestic” and includes water that people use in their homes for things such as cooking, bathing, drinking and removing household waste and for outdoor purposes including lawn watering, car-washing and swimming pools. Shortages to residential uses were valued using a tiered approach. In other words, the more severe the shortage, the more costly it becomes. For instance, a 2 acre-foot shortage for a group of households that use 10 acre-feet per year would not be as severe as a shortage that amounted to 8 acre-feet. In the case of a 2 acre-foot shortage, households would probably have to eliminate some or all outdoor water use, which could have implicit and explicit economic costs including losses to the horticultural and landscaping industry. In the case of an 8 acre-foot shortage, people would have to forgo all outdoor water use and most indoor water consumption. Economic costs would be much higher in this case because people could probably not live with such a reduction, and would be forced to find emergency alternatives. The alternative assumed in this study is a very uneconomical and worst-case scenario (i.e., hauling water in from other communities by truck or rail). Section 2.3.3 of this report discusses methodology for municipal uses in greater detail.

[5] A notable exception is the potential impacts to the nursery and landscaping industry that could arise due to reductions in outdoor residential uses and impacts to “water intensive” commercial businesses (see Section 2.3.3).

1.2 Measuring Social Impacts

As the name implies, the effects of water shortages can be social or economic. Distinctions between the two are both semantic and analytical in nature – more so analytic in the sense that social impacts are much harder to measure in quantitative terms. Nevertheless, social effects associated with drought and water shortages usually have close ties to economic impacts. For example, they might include:

- demographic effects such as changes in population,
- disruptions in institutional settings including activity in schools and government,
- conflicts between water users such as farmers and urban consumers,
- health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations),
- mental and physical stress (e.g., anxiety, depression, domestic violence),
- public safety issues from forest and range fires and reduced fire fighting capability,
- increased disease caused by wildlife concentrations,
- loss of aesthetic and property values, and
- reduced recreational opportunities.[6]

Social impacts measured in this study focus strictly on demographic effects including changes in population and school enrollment. Methods are based on models used by the TWDB for state water planning and by the U.S. Census Bureau for national level population projections. With the assistance of the Texas State Data Center (TSDC), TWDB staff modified population projection models used for state water planning and applied them here. Basically, the social impact model incorporates results from the economic component of the study and assesses how changes in labor demand due to unmet water needs could affect migration patterns in a region. Before discussing particulars of the approach model, some background information regarding population projection models is useful in understanding the overall approach.

1.2.1 Overview of Demographic Projection Models

More often than not, population projections are reported as a single number that represents the size of an overall population. While useful in many cases, a single number says nothing about the composition of projected populations, which is critical to public officials who must make decisions regarding future spending on public services. For example, will a population in the future have more elderly people relative to today, or will it have more children? More children might mean that more schools are needed. Conversely, a population with a greater percentage of elderly people may need additional healthcare facilities. When projecting future populations, cohort-survival models break down a population into groups (i.e., cohorts) based on factors such as age, sex and race. Once a population is separated into cohorts, one can estimate the magnitude and composition of future population changes.

Changes in a population's size and makeup in survival cohort models are driven by three factors:

[6] Based on information from the website of the National Drought Mitigation Center at the University of Nebraska Lincoln. Available online at: http://www.drought.unl.edu/risk/impacts.htm. See also, Vanclay, F. "*Social Impact Assessment*." in Petts, J. (ed) International Handbook of Environmental Impact Assessment. 1999.

1. *Births:* Obviously, more babies mean more people. However, only certain groups in a population are physically capable of bearing children– typically women between the ages of 13 and 49. The U.S. Census Bureau and the TSDC continually updates fertility rates for different cohorts. For each race/ethnicity category, birth rates decline and then stabilize in the future.

2. *Deaths:* When people die, populations shrink. Unlike giving birth, however, everyone is capable of dying and mortality rates are applied to all cohorts in a given population. Hence their name, cohort-survival models use survival rates as opposed to mortality rates. A survival rate is simply the probability that a given person with certain attributes (i.e., race, age and sex) will survive over a given period of time.

3. *Migration*: Migration is the movement of people in or out of a region. Migration rates used to project future changes in a region are usually based on historic population data. When analyzing historic data, losses or increases that are not attributed to births or deaths are assumed to be the result of migration. Migration can be further broken down into changes resulting from economic and non-economic factors. Economic migrants include workers and their families that relocate because of job losses (or gains), while non-economic migrants move due to lifestyles choices (e.g., retirees fleeing winter cold in the nation's heartland and moving to Texas).

In summary, knowledge of a population's composition in terms of age, sex and race combined with information regarding birth and survival rates, and migratory patterns, allows a great deal of flexibility and realism when estimating future populations. For example, an analyst can isolate population changes due to deaths and births from changes due to people moving in and out of a region. Or perhaps, one could analyze how potential changes in medical technology would affect population by reducing death rates among certain cohorts. Lastly, one could assess how changes in *economic conditions* might affect a regional population

1.2.2 Methodology for Social Impacts

Two components make up the model. The first component projects populations for a given year based on the following six steps:

1) *Separate "special" populations from the "general" population of a region:* The general population of a region includes the portion subject to rates of survival, fertility, economic migration and non-economic migration. In other words, they live, die, have children and can move in and out of a region freely. "Special populations," on the other hand, include college students, prisoners and military personnel. Special populations are treated differently than the general population. For example, fertility rates are not applied to prisoners because in general inmates at correctional facilities do not have children, and they are incapable of freely migrating or out of a region. Projections for special populations were compiled by the TSDC using data from the Higher Education Coordinating Board, the Texas Department of Criminal Justice and the U.S. Department of Defense. Starting from the 2000 Census, general and special populations were broken down into the following cohorts:

- age cohorts ranging from age zero to 75 and older,
- race/ethnicity cohorts, including Anglo, Black, Hispanic and "other," and
- gender cohorts (male and female).

2) *Apply survival and fertility rates to the general population* : Survival and fertility rates were compiled by the TSDC with data from the Texas Department of Health (TDH). Natural decreases (i.e., deaths) are estimated by applying survival rates to each cohort and then subtracting estimated deaths from the total population. Birth rates were then applied to females in each age

and race cohort in general and special populations (college and military only) to arrive at a total figure for new births.

3) *Estimate economic migration based on labor supply and demand*: TSDC year 2000 labor supply estimates include all non-disabled and non-incarcerated civilians between the ages of 16 and 65. Thus, prisoners are not included. Labor supply for years beyond 2001 was calculated by converting year 2000 data to rates according to cohort and applying these rates to future years. Projected labor demand was estimated based on historical employment rates. Differences between total labor supply and labor demand determines the amount of in or out migration in a region. If supply is greater than demand, there is an out-migration of labor. Conversely, if demand is greater than supply, there is an in-migration of labor. The number of migrants does not necessarily reflect total population changes because some migrants have families. To estimate how many people might accompany workers, a migrant worker profile was developed based on the U.S. Census Bureau's Public Use Microdata Samples (PUMs) data. Migrant profiles estimate the number of additional family members, by age and gender that accompany migrating workers. Together, workers and their families constitute economic migration for a given year.

4) *Estimate non-economic migration*: As noted previously, migration patterns of individuals age 65 and older are generally independent of economic conditions. Retirees usually do not work, and when they relocate, it is primarily because of lifestyle preferences. Migratory patterns for people age 65 or older are based on historical PUMs data from the U.S. Census.

5) *Calculate ending population for a given year*: The total year-ending population is estimated by adding together: 1) surviving population from the previous year, 2) new births, 3) net economic migration, 4) net non-economic migration and 5) special populations. This figure serves as the baseline population for the next year and the process repeats itself.

The second component of the social impact model is identical to the first and includes the five steps listed above for each year where water shortages are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060). The only difference is that labor demand changes in years with shortages. Shifts in labor demand stem from employment impacts estimated as part of the economic analysis component of this study with some slight modifications. IMPLAN employment data is based on the number of full and part-time jobs as opposed to the number of people working. To remedy discrepancies, employment impacts from IMPLAN were adjusted to reflect the number of people employed by using simple ratios (i.e., labor supply divided by number of jobs) at the county level. Declines in labor demand as measured using adjusted IMPLAN data are assumed to affect net economic migration in a given regional water planning area. Employment losses are adjusted to reflect the notion that some people would not relocate but would seek employment in the region and/or public assistance and wait for conditions to improve. Changes in school enrollment are simply the proportion of lost population between the ages of 5 and 17.

1.3 Clarifications, Assumptions and Limitations of Analysis

As with any attempt to measure and quantify human activities at a societal level, assumptions are necessary and every model has limitations. Assumptions are needed to maintain a level of generality and simplicity such that models can be applied on several geographic levels and across different economic sectors. In terms of the general approach used here several clarifications and cautions are warranted:

1) While useful for planning purposes, this study is not a benefit-cost analysis (BCA). BCA is a tool widely used to evaluate the economic feasibility of specific policies or projects as opposed to estimating economic impacts of unmet water needs. Nevertheless, one could include some impacts measured in this study as part of a BCA if done so properly.

2) Since this is not a BCA, future impacts are not weighted differently. In other words, estimates are not "discounted." If used as a measure of benefits in a BCA, one must consider the uncertainty of estimated monetary impacts.

3) All monetary figures are reported in constant year 2000 dollars.

4) Shortages reported by regional planning groups are the starting point for socioeconomic analyses. No adjustments or assumptions regarding the magnitude or distributions of unmet needs among different water use categories are incorporated in the analysis.

5) Estimated impacts are point estimates for years in which needs are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060).They are independent and distinct "what if" scenarios for each particular year and water shortages are assumed to be temporary events resulting from severe drought conditions combined with infrastructure limitations. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals and resultant impacts are measured. Given, that reported figures are not cumulative in nature, it is inappropriate to sum impacts over the entire planning horizon. Doing so, would imply that the analysis predicts that drought of record conditions will occur every ten years in the future, which is not the case. Similarly, authors of this report recognize that in many communities needs are driven by population growth, and in the future total population will exceed the amount of water available due to infrastructure limitations, *regardless of whether or not there is a drought*. This implies that infrastructure limitations would constrain economic growth. However, since needs as defined by planning rules are based upon water supply and demand under the assumption of drought of record conditions, it improper to conduct economic analysis that focuses on growth related impacts over the planning horizon. Figures generated from such an analysis would presume a 50-year drought of record, which is unrealistic. Estimating lost economic activity related to constraints on population and commercial growth due to lack of water would require developing water supply and demand forecasts under "normal" or "most likely" future climatic conditions. *It is critical to stress that this is a modeling assumption necessary to maintain consistency with planning criteria, which states that water availability be evaluated assuming drought of record conditions. Analysis in this report does not predict that the drought of record will recur, nor does it predict or imply that growth will or should occur as projected.*

6) IO multipliers measure the strength of backward linkages to supporting industries (i.e., those who sell inputs to an affected sector). However, multipliers say nothing about forward linkages consisting of businesses that purchase goods from an affected sector for further processing. For example, ranchers in many areas sell most of their animals to local meat packers who process animals into a form that consumers ultimately see in grocery stores and restaurants. Multipliers do not capture forward linkages to meat packers, and since meat packers sell livestock purchased from ranchers as "final sales," multipliers for the ranching sector do fully account for all losses to a region's economy. Thus, as mentioned previously, in some cases closely linked sectors were moved from one water use category to another.

7) Cautions regarding interpretations of direct and secondary impacts are warranted. IO/SAM multipliers are based on "fixed-proportion production functions," which basically means that input use - including labor - moves in lockstep fashion with changes in levels of output. In a scenario where output (i.e., sales) declines, losses in the immediate sector or supporting sectors could be much less than predicted by an IO/SAM model for several reasons. For one, businesses will likely expect to continue operating so they might maintain spending on inputs for future use; or they may be under contractual obligations to purchase inputs for an extended period regardless of external conditions. Also, employers may not lay-off workers given that experienced labor is sometimes scarce and skilled personnel may not be readily available when water shortages subside. Lastly people who lose jobs might find other employment in the region. As a result, direct losses

for employment and secondary losses in sales and employment should be considered an *upper bound*. Similarly, since population projections are based on reduced employment in the region, they should be considered an upper bound as well.

8) IO models are static in nature. Models and resultant multipliers are based upon the structure of the U.S. and regional economies in the year 2000. In contrast, unmet water needs are projected to occur well into the future (i.e., 2010 through 2060). Thus, the analysis assumes that the general structure of the economy remains the same over the planning horizon.

9) With respect to municipal needs, an important assumption is that people would eliminate all outdoor water use before indoor water uses were affected, and people would implement emergency indoor water conservation measures before commercial businesses had to curtail operations, and households had to seek alternative sources of water. Section 2.3.3 discusses this in greater detail.

10) Impacts are annual estimates. If one were to assume that conditions persisted for more than one year, figures should be adjusted to reflect the extended duration. The drought of record in Texas for many communities lasted several years.

2. Economic Impacts

Part 2 of this report summarizes economic analysis for each water use category. Section 2.1 presents the year 2000 economic baseline for Region M. Section 2.2 presents results for agricultural water uses including livestock and irrigated crop production, while Section 2.3 reviews impacts to municipal and industrial water uses including manufacturing, mining, steam-electric and municipal demands.

2.1 Economic Baseline

Table 2 summarizes baseline economic variables.[7] In year 2000, Region M produced $32,549 million in output that generated $17,412 million in income for residents in the region. Economic activity supported an estimated 481,449 full and part-time jobs. Business and industry also generated $1,343 million in state and local taxes. Sections 2.2.and 2.3 discuss contributions of individual water use categories in greater detail.

Table 2: Year 2000 Economic Baseline for Region M (monetary figures reported in $millions)

	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Irrigation	$393.24	$32.47	$360.77	5,973	$114.17	$7.05
% of Total	1%	<1%	1%	1%	1%	1%
Livestock	$127.31	$82.37	$44.94	2,918	$63.24	$4.45
% of Total	<1%	1%	<1%	1%	<1%	<1%
Manufacturing	$4,376.79	$647.42	$3,729.36	37,781	$1,210.74	$32.99
% of Total	13%	7%	16%	8%	7%	2%
Mining	$573.25	$150.26	$422.99	1,158	$218.51	$27.32
% of Total	2%	2%	2%	0%	1%	2%
Steam Electric	$354.12	$63.15	$290.97	661	$242.15	$41.22
% of Total	1%	1%	1%	<1%	1%	3%
Municipal*	$26,837.45	$6,187.05	$20,650.41	434,714	$15,595.83	$1,232.20
% of Total	82%	89%	80%	90%	89%	92%
Total	$32,662.15	$7,162.72	$25,499.43	483,205	$17,444.65	$1,345.24
% of Total	100%	100%	100%	100%	100%	100%

* Municipal includes all non-industrial commercial enterprises and institutional water uses such as the military, schools and other government organizations. Source: Generated using IMPLAN models and data from MIG, Inc.

[7] Baseline figures for income and employment may differ than those presented in year 2002 regional water plans for several reasons. For one, estimates shown in 2002 stem from 1995 economic data. In contrast, current figures are based upon year 2000 data. In addition, previous estimates included annual payroll costs only. Income as defined in Table 2 includes additional measures of wealth such as corporate income, payroll benefits, rental income, proprietor income and interest payments. Figures for jobs in Table 2 are higher because they include full *and* part-time positions. Baseline employment data in 2002 plans reported full-time jobs only.

2.2 Agriculture

Agriculture is a small but important component of the region's economy. In 2000, farmers using irrigation produced $281 million dollars worth of crops that generated a total of $82 million in income. With $127 million in sales, the region's livestock industry is somewhat smaller. Collectively, irrigated farming and the livestock industry accounted for around two percent of regional income and jobs.

2.2.1 Irrigation

The first step in estimating impacts to irrigation required calculating gross sales for IMPLAN crop sectors. Default IMPLAN data do not distinguish irrigated production from dry-land production. Once gross sales were known other statistics such as employment and income were derived using IMPLAN direct multiplier coefficients. Gross sales for a given crop are based on two data sources:

1) county-level statistics collected and maintained by the TWDB and the USDA Natural Resources Conservation Service (NRCS) including the number of irrigated acres by crop type and water application per acre, and

2) regional-level data published by the Texas Agricultural Statistics Service (TASS) including prices received for crops (marketing year averages), crop yields and crop acreages.

Crop categories used by the TWDB differ from those used in IMPLAN datasets. To maintain consistency, sales and other statistics are reported using IMPLAN crop classifications. Table 3 shows the TWDB crops included in corresponding IMPLAN sectors. Table 4 summarizes acreage and estimated annual water use for each crop classification. Table 5 shows baseline economic data for irrigated crop production in the region.[8] When measured in dollars, vegetables, fruits (primarily citrus), cotton and sugar crops (sugar cane) are the largest sectors. With $185 million in sales, vegetables alone account for slightly more than one-half or all irrigated crop production in the region.

Table 3: Crop Classifications Used in TWDB Water Use Survey and Corresponding IMPLAN Crop Sectors Applied in Socioeconomic Impact Analysis

IMPLAN Sector	TWDB Sector
Cotton	Cotton
Feed Grains	Corn, sorghum and "forage crops"
Food Grains	Rice, wheat and "other grains"
Fruits	Citrus
Hay and Pasture	Alfalfa and "other hay and pasture"
Oil Crops	Peanuts, soybeans and "other oil crops"
Sugar Crops	Sugarbeets and sugarcane
Tree Nuts	Pecans
Vegetables *	Deep-rooted vegetables, shallow-rooted vegetables and potatoes
Other Crops	"All other crops" "other orchards" and vineyards

* includes melons.

[8] Economic figures for irrigation are based on estimated production in 1994 rather than 2000. Regional Planning Group M opted to use 1994 as the baseline year for irrigation given than water availability and hence agricultural production in 2000 was abnormal due to a variety of climatological and political factors.

Table 4. Summary of Irrigated Crop Acreage and Water Demand for Region M (1994)				
Sector	Acres (1000s)	Distribution of Acres	Water Use (1000s of AF)	Distribution of Water Use
Cotton	116.77	25%	169	16%
Feed Grains	110.81	24%	189	17%
Sugar Crops	59.57	13%	235	22%
Vegetables	58.38	12%	187	17%
Hay and Pasture	47.66	10%	91	8%
Fruits	38.13	8%	122	11%
Tree Nuts	15.49	3%	48	4%
Other Crops	21.45	5%	43	4%
Total	468.25	100%	1,084	100%

Source: Statistics for irrigated crop acreage are based upon annual survey data collected by the TWDB and the National Resources Conservation Service (USDA).

Table 5: Baseline for Irrigation in Region M (monetary figures reported in $millions)						
	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Vegetables	$184.93	$20.06	$164.86	2,109	$55.22	$2.07
Fruits	$66.93	$1.38	$65.55	1,164	$9.40	$0.56
Sugar Crops	$53.84	$2.05	$51.79	933	$24.50	$2.11
Cotton	$43.13	$3.11	$40.03	342	$11.18	$0.97
Feed Grains	$24.08	$0.99	$23.09	440	$7.92	$0.89
Hay and Pasture	$9.50	$0.39	$9.11	650	$2.50	$0.25
Miscellaneous Crops	$9.02	$4.33	$4.69	295	$2.89	$0.19
Tree Nuts	$1.41	$0.02	$1.39	29	$0.45	$0.01
Food Grains	$0.40	$0.13	$0.26	11	$0.10	$0.01
Total	$393.24	$32.47	$360.77	5,973	$114.17	$7.05

Source: Generated using IMPLAN models and data from MIG, Inc, and the Texas Agricultural Statistics Service.

An important consideration when estimating impacts to irrigation was determining which crops are affected by water shortages. One approach is the so-called rationing model, which assumes that farmers respond to water supply cutbacks by fallowing the lowest value crops in the region first and the highest valued crops last until the amount of water saved equals the shortage.[9] For example, if farmer A grows vegetables (higher value) and farmer B grows wheat (lower value) and they both face a proportionate cutback in irrigation water, then farmer B will sell water to farmer A. Farmer B will fallow her irrigated acreage before farmer A fallows anything. Of course, this assumes that farmers can and do transfer enough water to allow this to happen. A different approach involves constructing farm-level profit maximization models that conform to widely-accepted economic theory that farmers make decisions based on marginal net returns. Such models have good predictive capability, but data requirements and complexity are high. Given that a detailed analysis for each region would require a *substantial* amount of farm-level data and analysis, the following investigation assumes that projected shortages are distributed equally across predominant crops in the region. "Predominant" in this case are crops that comprise at least one percent of total acreage in the region (see Table 4).

The following steps outline the overall method used to estimate direct impacts to irrigated agriculture:

1. *Distribute shortages across predominant crop types in the region*. Again, unmet water needs were distributed equally across crop sectors that constitute one percent or more of irrigated acreage in 2000.

2. *Estimate associated reductions in output for affected crop sectors*. Output reductions are based on elasticities discussed in Section 1.2.1 and on estimated values per acre for different crops. Values per acre stem from the same data used to estimate output for the year 2000 baseline. Given that 2000 may have been an unusually poor or productive year for some crops and not necessarily representative of normal conditions, statistics regarding yield, price and acreage for crop sectors were averaged over a five-year period (1995-2000) if sufficient data were available.

3. *Offset reductions in output by revenues from dry-land production.* If TASS acreage data indicate that farmers grow a dry-land version of a given crop in the region (e.g., cotton or corn), estimated losses from irrigated acreage are offset by assumed revenues from dry-land harvests. Basically, the analysis assumes that farmers who use irrigation would try and grow something even if irrigation water were not available. Given that water shortages are expected to occur under drought conditions, values per acre for dry-land crops are based on 1998 and/or 1996 yields and prices. Both 1996 and 1998 were particularly bad drought years for most of West Texas. Table 6 summarizes data used to estimate the value of lost output.

[9] The rationing model was initially proposed by researchers at the University of California at Berkeley, and was then modified for use in a study conducted by the U.S. Environmental Protection Agency that evaluated how proposed water supply cutbacks recommended to protect water quality in the Bay/Delta complex in California would affect farmers in the Central Valley. See, Zilberman, D., Howitt, R. and Sunding, D. "*Economic Impacts of Water Quality Regulations in the San Francisco Bay and Delt*a." Western Consortium for Public Health. May 1993.

Table 6: Data Used to Estimate Impacts to Irrigated Crop Production in Region M			
Crop sector	Gross sales revenue per irrigated acre	Gross sales revenue per dry-land acre (drought conditions)	Data Sources for yield, prices and planted acreage used to estimate gross sales per acre
Cotton	$340	$105	Based on five-year (1995-2000) price, yield and acreage data from TASS for Lower Valley Region. Dry-land Value based on 1996 data for Edwards Plateau Region.
Feed Grains	$170	$75	Based on five-year (1995-2000) price, yield and acreage data from TASS for corn and grain sorghum in Lower Valley Region. Dry-land Value based on same data using 1998 figures only.
Fruit	$1500	$0	Based on TAMU crop budget enterprise data for grapefruit orchards. Average value for year 2000 for 3-year, 4-year, 5-year, 6-year and 7-year old orchards in South Texas Region.
Hay Pasture	$220	$110	Based on TAMU data for South Texas Region for coastal Bermuda hay (average of 3, 4 and 5 cuttings). Dry-land value assumes a 50 percent reduction in yield.
Sugar Crops	$765	$0	Based on TAMU Crop Enterprise Budget data for sugar cane (planted and ratoon crop) for year 2000 for South Central District.
Tree Nuts	$515	$0	Five year (1995-2000) statewide average for pecans. Based on TASS data.
Vegetables	$1870	$0	Based on TASS statewide five-year (1995-2000) data for deep-rooted vegetables and melons.
All values are rounded. TASS = Texas Agricultural Statistics Service. TAMU = Texas A&M University.			

The Region M 2006 Water Plan indicates that under drought of record conditions, shortages to irrigation would occur in Cameron, Hidalgo, Maverick, Starr, Webb, Willacy and Zapata counties. Table 7 summarizes estimated impacts. Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin.

Table 7: Annual Economic Impacts Associated with Unmet Irrigation Water Needs (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)				
Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$155.27	$60.51	2,885	$3.03
2020	$120.26	$46.90	2,235	$2.37
2030	$116.59	$45.45	2,165	$2.27
2040	$122.64	$47.83	2,270	$2.41
2050	$122.64	$47.83	2,270	$2.41
2060	$122.64	$47.83	2,270	$2.41

* Estimates are based on projected economic activity in the region. Source: Based on economic impact models developed by the Texas Water Development Board, Office of Water Planning.

2.2.2 Livestock

Table 8 summarizes economic indicators for livestock in Region M. Cattle ranching and feedlot operations are key livestock sectors. In 2000, cattle production produced about $114 million in output and $63 million worth of income. Livestock water shortages are projected to occur in Maverick County in the Nueces-Rio Grande River Basin. Compared to other water use categories needs for livestock are relatively small, and the analysis assumes that ranchers would haul water by truck to fill stock tanks. Table 9 shows estimated annual costs.

Table 8: Year 2000 Baseline for Livestock in Region M (monetary figures are reported in $millions)						
	Sales Activity			Jobs	Regional Income	Business Taxes
Sector	Total	Intermediate	Final			
Range Fed Cattle	$53.54	$23.16	$30.38	1,829	$21.67	$1.39
Cattle Feedlots	$48.18	$41.50	$6.68	359	$35.85	$2.76
Ranch Fed Cattle	$12.17	$11.90	$0.27	354	$3.39	$0.24
Miscellaneous Livestock	$8.13	$4.19	$3.94	304	$0.94	$0.03
Dairy Farm Products	$2.56	$0.09	$2.47	22	$0.76	$0.01
Poultry and Eggs	$1.76	$0.59	$1.18	15	$0.44	$0.01
Hogs, Pigs and Swine	$0.84	$0.82	$0.01	16	$0.15	$0.02
Sheep, Lambs and Goats	$0.13	$0.12	$0.01	19	$0.04	$0.00
Other Livestock	$0.01	$0.01	$0.00	1	$0.00	$0.00
Total	$127.31	$82.37	$44.94	2,918	$63.24	$4.45

Source: Based input-output models generated using IMPLAN Pro software from MIG Inc, and data from the Texas Agricultural Statistics Service. Figures are rounded.

Table 9: Annual Costs to Livestock Producers (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)	
Year	$millions
2010	$0.67
2020	$0.67
2030	$0.67
2040	$0.67
2050	$0.67
2060	$0.67
Source: Texas Water Development Board, Office of Water Planning.	

2.3 Municipal and Industrial

2.3.1 Manufacturing

Table 10 summarizes baseline economic data for manufacturing sectors in the region. Apparel, motor vehicle parts, plastic products, meat-packing plants, prepared seafood and paperboard containers are the leader sectors with total sales of $1,930 million. In 2000, these sectors supported an estimated 13,382 jobs that provided regional residents incomes worth slightly less than $429 million.

Table 10: Year 2000 Baseline Economic Activity for Manufacturing in Region M (monetary figures are reported in $millions)						
Sector	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Apparel	$919.98	$21.20	$898.78	8,766	$216.66	$3.56
Motor Vehicle Parts	$258.50	$39.49	$219.01	1,083	$74.67	$1.02
Electronic Components	$234.97	$70.74	$164.23	933	$47.00	$1.66
Plastics Products	$142.61	$2.25	$140.36	890	$33.01	$0.77
Meat Packing Plants	$131.59	$14.89	$116.70	357	$8.12	$0.58
Prepared Fish and Seafood	$121.88	$0.79	$121.09	807	$17.09	$0.62
Paperboard Containers	$120.72	$71.48	$49.24	546	$33.18	$1.25
All other manufacturing sectors	$2,446.53	$426.58	$2,019.95	24,399	$781.01	$23.52
Total	$4,376.79	$647.42	$3,729.36	37,781	$1,210.74	$32.99
Source: Generated by the Texas Water Development Board, Office of Water Planning using IMPLAN Pro™ software and data.						

Direct impacts to manufacturing were estimated by distributing water shortages among industrial sectors at the county level. Care was taken to include only sectors recorded in the TWDB Water Uses database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable uses. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes in TWDB databases were matched to IMPLAN sector codes for each affected county. Non-matches were excluded when calculating direct impacts.

The distribution of water shortages among TWDB manufacturing sectors is weighted according to year 2000 water use. Accordingly, industries with the greatest use are affected the most. As a general observation, these sectors include petroleum and chemical refineries, plastic producers, paper mills, food processors and cement manufacturers. Other manufacturing sectors use considerably less water for productive processes and are less likely to suffer substantial negative effects due to water shortages. In other words, they would likely be able to haul in enough water by truck to keep their operations running.

The Region M 2006 Water Plan indicates that under drought of record conditions, shortages to manufacturing water uses would occur in Cameron, Hidalgo and Willacy counties and could affect several types of industries including food and drink processors, yarn and fabric mills and cement manufacturers. Table 11 summarizes estimated impacts. Attachment B of this report shows impacts by county, while Attachment C shows impacts by major river basin.

Table 11: Annual Economic Impacts Associated with Unmet Manufacturing Water Needs
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$161.65	$47.61	1,255	$1.83
2020	$377.71	$117.01	3,085	$4.49
2030	$677.63	$136.74	3,610	$5.25
2040	$499.97	$156.28	4,120	$6.00
2050	$575.70	$180.62	4,765	$6.94
2060	$677.63	$213.37	5,630	$8.20

* Estimates are based on projected economic activity in the region. Source: Based on economic impact models developed by the Texas Water Development Board, Office of Water Planning.

2.3.2 Mining

Table 12 summarizes sales, employment and regional income for the mining industry in Region M. In 2000, mining sectors generated $573 million worth of income and provided jobs for 1,158 workers. Natural gas and petroleum extraction accounts for over 95 percent of mining activity.

Table 12: Year 2000 Baseline for Mining in Region M (monetary figures are in $millions)						
Sector	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Natural Gas & Crude Petroleum	$560.29	$148.90	$411.39	1,011	$211.20	$26.84
All other mining sectors	$12.96	$1.36	$11.60	147	$7.31	$0.48
Total	$573.25	$150.26	$422.99	1,158	$218.51	$27.32

Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN software.

When estimating impacts to natural gas and oil extraction a major consideration is that the petroleum and gas extraction industry only uses water in significant amounts for secondary recovery. Known in the industry as “enhanced” or “water flood” extraction, secondary recovery involves pumping water down injection wells to increase underground pressure thereby pushing oil or gas into other wells. IMPLAN output numbers do not distinguish between secondary and non-secondary recovery. To account for the discrepancy, county-level data from the Texas Railroad Commission (TRC) showing the proportion of barrels produced using secondary methods were used to adjust IMPLAN data to reflect only the portion of sales attributed to secondary recovery.

An additional problem with standard IMPLAN data matter relates to estimates of output at the county level. In general, IMPLAN data for mining at the county level reflect sales and employment, but not necessarily physical output. For instance, a mining company and its employees may be based in Dallas County Texas, but most of its product comes from oil well leases in West Texas. However, company sales and employment figures are reported for Dallas County. To account for potential discrepancies, analysts relied on data from the TRC to check the accuracy of output in affected counties by comparing average well-head market prices for crude and gas to TRC production statistics in each county. If there were large discrepancies, estimates that reflect physical output based on TRC data were used instead of IMPLAN data.

The 2006 Region M Water Plan indicates that under drought of record conditions, shortages to mining could occur in Willacy County in the Nueces-Rio Grande River Basin. Table 13 shows estimated impacts.

Table 13: Annual Economic Impacts Associated with Unmet Water Needs for Mining Water Uses (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)				
Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$2.07	$1.08	10	$0.02
2020	$2.07	$1.08	10	$0.02
2030	$2.07	$1.08	10	$0.02
2040	$2.07	$1.08	10	$0.02
2050	$2.07	$1.08	10	$0.02
2060	$2.07	$1.08	10	$0.00

* Estimates are based on *projected* economic activity in the region. Source: Based on economic impact models developed by the Texas Water Development Board, Office of Water Resources Planning.

2.3.3 Municipal

Table 14 summarizes economic activity for municipal uses. In 2000, businesses and institutions that make up the municipal category produced $26,837 million worth of goods and services. In return, they received $15,595 million in wages, salaries and profits. Municipal uses generate the bulk of business taxes in the region – nearly $1,232 million (92 percent of all business taxes generated in the region). Top sectors include state and local government, banking, transportation and warehousing, real estate and eating and drinking establishments.

Table 14: Year 2000 Baseline Data for Municipal Water Uses in Region M (monetary figures reported in $millions)						
Sector	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
State and Local Govt. (Education)	$1,846.08	$0.00	$1,846.08	57,306	$1,846.08	$0.00
Banking	$1,459.40	$313.80	$1,145.60	7,971	$942.85	$23.59
Transport and Warehousing	$1,427.64	$505.78	$921.85	14,544	$537.42	$16.89
Wholesale Trade	$1,346.56	$628.46	$718.10	17,419	$735.25	$191.27
Real Estate	$1,042.74	$413.03	$629.71	5,907	$618.36	$123.37
Eating & Drinking	$947.28	$39.95	$907.34	27,675	$426.48	$59.51
All Other Municipal Sectors	$17,916.52	$4,261.77	$13,654.74	278,671	$10,139.34	$806.65
Total	$26,837.45	$6,187.05	$20,650.41	434,714	$15,595.83	$1,232.20

Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN software.

Estimating direct economics impacts for the municipal category is complicated for several reasons. For one, municipal uses comprise a range of different consumers including commercial businesses, institutions (e.g., schools and government) and households. However, reported shortages do not specify how needs are distributed among different consumers. In other words, how much of a municipal need is commercial and how much is residential? The amount of commercial water use as a percentage of total municipal demand was estimated based on "GED" coefficients (gallons per employee per day) published in secondary sources (see Attachment A). For example, if year 2000 baseline data for a given economic sector (e.g., amusement and recreation services) shows employment at 30 jobs and the GED coefficient is 200, then average daily water use by that sector is (30 x 200 = 6,000 gallons) and thus annual use is 6.7 acre-feet. Water not attributed to commercial use is considered domestic, which includes single and multi-family residential consumption, institutional uses and all use designated as "county-other." The estimated proportion of water used for commercial purposes ranges from about 5 to 35 percent of total municipal demand at the county level. Less populated rural counties occupy the lower end of the spectrum, while larger metropolitan counties are at the higher end.

As mentioned earlier, a key study assumption is that people would eliminate outdoor water use before indoor water consumption was affected; and they would implement *voluntary* emergency indoor water conservation measures before people had to curtail business operations or seek emergency sources of water. This is logical because most water utilities have drought contingency plans. Plans usually specify curtailment or elimination of outdoor water use during periods of drought. In Texas, state law requires retail and wholesale water providers to prepare and submit plans to the Texas Commission on Environmental Quality (TCEQ). Plans must specify demand management measures for use during drought including curtailment of "non-essential water uses."[10] Thus, when assessing municipal needs there are several important considerations: 1) how much of a need would people reduce via eliminating outdoor uses and implementing emergency indoor conservation measures; and 2) what are the economic implications of such measures?

Determining how much water is used for outdoor purposes is key to answering these questions. The proportion used here is based on several secondary sources. The first is a major study sponsored by the American Water Works Association, which surveyed cities in states including Colorado, Oregon, Washington, California, Florida and Arizona. On average across all cities surveyed 58 percent of residential water use was for outdoor activities. In cities with climates comparable to large metropolitan areas of Texas, the average was 40 percent.[11]Earlier findings of the U.S. Water Resources Council showed a national average of 33 percent. Similarly, the United States Environmental Protection Agency (USEPA) estimated that landscape watering accounts for 32 percent of total residential and commercial water use on annual basis.[12] A study conducted for the California Urban Water Agencies (CUWA) calculated values ranging from 25 to 35 percent.[13] Unfortunately, there does not appear to be any comprehensive research that has estimated non-agricultural outdoor water use in Texas. As an approximation, an average annual value of 30 percent based on the above references was selected to serve as a rough estimate in this study. With respect to emergency indoor conservation measures, this analysis assumes that citizens in affected communities would reduce needs by an additional 20 percent. Thus, 50

[10] Non-essential uses include, but are not limited to, landscape irrigation and water for swimming pools or fountains. For further information see the Texas Environmental Quality Code §288.20.

[11] See, Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W., Dziegielewski, D., Nelson, J.O. "*Residential End Uses of Water*." Research sponsored by the American Water Works Association and completed by Aquacraft, Inc. and Planning and Management Consultants, Ltd. (PMCL@CDM).

[12] U.S. Environmental Protection Agency. *"Cleaner Water through Conservation*." USEPA Report no. 841-B-95-002. April, 1995.

[13] Planning and Management Consultants, Ltd. "*Evaluating Urban Water Conservation Programs: A Procedures Manual*." Prepared for the California Urban Water Agencies. February 1992.

percent of total needs could be eliminated before households and businesses had to implement emergency water procurement activities.

Eliminating outdoor watering would have a range of economic implications. For one, such a restriction would likely have adverse impacts on the landscaping and horticultural industry. If people are unable to water their lawns, they will likely purchase less lawn and garden materials such as plants and fertilizers. On the other hand, during a bad drought people may decide to invest in drought tolerant landscaping, or they might install more efficient landscape plumbing and other water saving devices. But in general, the horticultural industry would probably suffer considerable losses if outdoor water uses were restricted or eliminated. For example, many communities in Colorado, which are in the midst of a prolonged drought, have severely restricted lawn irrigation. In response, the turf industry in Colorado has laid off at least 50 percent of its 2,000 employees.[14] To capture impacts to the horticultural industry, regional sales net of exports for the greenhouse and nursery sectors and the landscaping services sector were reduced in proportion to reductions in outdoor water use. Note that these losses would not necessarily appear as losses to the regional or state economies because people would likely spend the money that they would have spent on landscaping on other goods in the economy. Thus, the net effect on state or regional accounts could be neutral.

Other considerations include the "welfare" losses to consumers who had to forgo outdoor and indoor water uses to reduce needs. In other words, the water that people would have to give up has an economic value. Estimating the economic value of this forgone water for each planning area would be a very time consuming and costly task, and thus secondary sources served as a proxy. Previous research funded by the TWDB, explored consumer "willingness to pay" for avoiding restrictions on water use.[15] Surveys revealed that residential water consumers in Texas would be willing to pay – on average across all income levels - $36 to avoid a 30 percent reduction in water availability lasting for at least 28 days. Assuming the average person in Texas uses 140 gallons per day and the typical household in the state has 2.7 persons (based on U.S. Census data), total monthly water use is 13,205 gallons per household. Therefore, the value of restoring 30 percent of average monthly water use during shortages to residential consumers is roughly one cent per gallon or $2,930 per acre-foot. This figure serves as a proxy to measure consumer welfare losses that would result from restricted outdoor uses and emergency indoor restrictions.

The above data help address the impacts of incurring water needs that are 50 percent or less of projected use. Any amount greater than 50 percent would result in municipal water consumers having to seek alternative sources. Costs to residential and non-water intensive commercial operations (i.e., those that use water only for sanitary purposes) are based on the most likely alternative source of water in the absence of water management strategies. In this case, the most likely alternative is assumed to be "hauled-in" water from other communities at annual cost of $6,530 per acre-foot for small rural communities and approximately and $10,995 per acre-foot for metropolitan areas.[16]

This is not an unreasonable assumption. It happened during the 1950s drought and more recently in Texas and elsewhere. For example, in 2000 at the heels of three consecutive drought years Electra - a small town in North Texas - was down to its last 45 days worth of reservoir water

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[14] Based on assessments of the Rocky Mountain Sod Growers. See, "*Drought Drying Up Business for Landscapers*." Associated Press. September, 17 2002.

[15] See, Griffin, R.C., and Mjelde, W.M. "*Valuing and Managing Water Supply Reliability*. Final Research Report for the Texas Water Development Board: Contract no. 95-483-140." December 1997.

[16] For rural communities, figure assumes an average truck hauling distance of 50 miles at a cost of 8.4 cents per ton-mile (an acre foot of water weighs about 1,350 tons) with no rail shipment. For communities in metropolitan areas, figure assumes a 50 mile truck haul, and a rail haul of 300 miles at a cost of 1.2 cents per ton-mile. Cents per ton-mile are based on figures in: Forkenbrock, D.J., "*Comparison of External Costs of Rail and Truck Freight Transportation*." Transportation Research. Vol. 35 (2001).

when rain replenished the lake, and the city was able to refurbish old wells to provide supplemental groundwater. At the time, residents were forced to limit water use to 1,000 gallons per person per month - less than half of what most people use - and many were having water hauled delivered to their homes by private contractors.[17] In 2003 citizens of Ballinger, Texas, were also faced with a dwindling water supply due to prolonged drought. After three years of drought, Lake Ballinger, which supplies water to more than 4,300 residents in Ballinger and to 600 residents in nearby Rowena, was almost dry. Each day, people lined up to get water from a well in nearby City Park. Trucks hauling trailers outfitted with large plastic and metal tanks hauled water to and from City Park to Ballinger.[18] In Australia, four cities have run out of water as a result of drought, and residents have been trucking in water since November 2002. One town has five trucks carting about one acre-foot eight times daily from a source 20 miles away. They had to build new roads and infrastructure to accommodate the trucks. Residents are currently restricted to indoor water use only.[19]

Direct impacts to commercial sectors were estimated in a fashion similar to other business sectors. Output was reduced among "water intensive" commercial sectors according to the severity of projected shortages. Water intensive is defined as non-medical related sectors that are heavily dependent upon water to provide their services. These include:

- car-washes,
- laundry and cleaning facilities,
- sports and recreation clubs and facilities including race tracks,
- amusement and recreation services,
- hotels and lodging places, and
- eating and drinking establishments.

For non-water intensive sectors, it is assumed that businesses would haul water by truck and/or rail.

An example will illustrate the breakdown of municipal water needs and the overall approach to estimating impacts of municipal needs. Assume City B has an unmet need of 50 acre feet in 2020 and projected demands of 200 acre-feet. In this case, residents of City B could eliminate needs via restricting all outdoor water use. City A, on the other hand, has an unmet need of 150 acre-feet in 2020 with a projected demand of 200 acre-feet. Thus, total shortages are 75 percent of total demand. Emergency outdoor and indoor conservation measures would eliminate 50 percent of projected needs; however, 50 acre-feet would still remain. This remaining portion would result in costs to residential and commercial water users. Water intensive businesses such as car washes, restaurants, motels, race tracks would have to curtail operations (i.e., output would decline), and residents and non-water intensive businesses would have to have water hauled-in assuming it was available.

The last element of municipal water shortages considered focused on lost water utility revenues. Estimating these was straightforward. Analyst used annual data from the "*Water and Wastewater Rate Survey*" published annually by the Texas Municipal League to calculate an average value per acre-foot for water and sewer. For water revenues, averages rates multiplied by total water needs served as a proxy. For lost wastewater, total unmet needs were adjusted for return flow factor of 0.60 and multiplied by average sewer rates for the region. Needs reported as "county-other" were excluded under the presumption that these consist primarily of self-supplied water uses. In addition, 15 percent of water demand and needs are considered non-billed or "unaccountable" water that comprises things such leakages and water for municipal government functions (e.g., fire departments). Lost tax receipts are based on current rates for the

[17] Zewe, C. "*Tap Threatens to Run Dry in Texas Town*." July 11, 2000. CNN Cable News Network.

[18] Associated Press, "*Ballinger Scrambles to Finish Pipeline before Lake Dries Up*." May 19, 2003.

[19] Healey, N. (2003) *Water on Wheels*, Water: Journal of the Australian Water Association, June 2003.

“miscellaneous gross receipts tax, “which the state collects from utilities located in most incorporated cities or towns in Texas.

The Region M 2006 Water Plan indicates that under drought of record conditions, municipal water shortages would occur in all counties in the region. Tables 15 through 18 summarize estimated impacts to domestic uses, commercial businesses, water utilities and the horticultural industry. Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin.

Table 15: Annual Economic Impacts of Unmet Water Needs for Water Intensive Commercial Businesses
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$13.36	$7.03	330	$0.82
2020	$16.08	$8.46	395	$0.98
2030	$107.19	$56.06	2,630	$6.60
2040	$174.41	$93.67	4,015	$9.74
2050	$416.78	$230.37	8,865	$20.61
2060	$691.18	$386.59	14,210	$32.35

* Estimates are based on *projected* economic activity in the region. Source: Source: Texas Water Development Board, Office of Water Resources Planning.

Table 16: Annual Economic Impacts of Unmet Water Needs for the Horticultural Industry
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$11.50	$4.78	145	$0.09
2020	$31.12	$12.95	440	$0.23
2030	$59.68	$24.83	980	$0.45
2040	$89.86	$37.39	1,685	$0.67
2050	$123.91	$51.55	2,650	$0.92
2060	$174.32	$72.53	4,410	$1.30

Source: Generated by the Texas Water Development Board, Office of Water Resources Planning.

Table 17: Annual Impacts Associated with Unmet Domestic Water Needs (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)	
Year	$millions
2010	$64.47
2020	$174.74
2030	$327.52
2040	$523.23
2050	$820.03
2060	$1,175.05
Source: Generated by Texas Water Development Board, Office of Water Resources Planning.	

Table 18: Impacts to Water Utilities (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)		
Year	Revenues ($millions)	Utility Taxes ($millions)
2010	$24.13	$0.42
2020	$67.96	$1.20
2030	$127.79	$2.25
2040	$198.72	$3.50
2050	$281.78	$4.97
2060	$369.96	$6.52
Source: Texas Water Development Board, Office of Water Resources Planning.		

2.3.4 Steam Electric

The steam electric sector represents economy activity associated with retail and wholesale transactions of electricity. As shown in Table 19, in 2000 the electric services sector generated annual sales of approximately $354 million that resulted in nearly $242 million in income for Region M residents. Electric utilities support 660 full and part-time jobs.

Table 19:Year 2000 Direct Economic Activity Associated with Steam Electric Production in Region M ((monetary figures are in $millions)

Sector	Sales Activity			No. of Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Electric Services	$321.78	$57.42	$264.36	590	$230.12	$41.22
State and Local Electric Utilities	$32.33	$5.73	$26.60	70	$12.03	$0.00
Total	$354.12	$63.15	$290.97	660	$242.15	$41.22

Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN software.

Without adequate cooling water, power plants cannot safely operate. As water availability falls below projected demands, water levels in lakes and rivers that provide cooling water would also decline, particularly during drought when surface flows are reduced. Low water levels could affect raw water intakes and water discharge outlets (i.e., outfalls) at power facilities in several ways. For one, power plants are regulated by thermal emission guidelines that specify the maximum amount of heat that can go back into a river or lake via discharged cooling water. Low lake or river levels could result in permit compliance issues due to reduced dilution and dispersion of heat and subsequent impacts on aquatic biota near outfalls.[20] But the primary concern would be a loss of head (i.e., pressure) over intake structures that would decrease flows through intake tunnels. This could affect safety related pumps, increase operating costs and/or result in sustained shut-downs. Assuming plants did shutdown, they would not be able to generate electricity, which implies that output (i.e., sales of electricity) would decline.

Among all water use categories, steam-electric is unique and cautions are necessary when applying methods used in this study. Measured changes to an economy using input-output models stem directly from changes in sales revenue. In the case of water shortages, one assumes that businesses will suffer lost output if process water is in short supply. For power generation facilities this is true as well. However, the electric services sector in IMPLAN represents a corporate entity that may own and operate several power plants in a given region. If one plant became inoperable due to water shortages, plants in other areas or generation facilities that do not rely heavily water (e.g., gas powered turbines or "peaking plants") might be able to compensate for lost generating capacity. Utilities could also offset lost production via purchases on the spot market.[21] Thus, to presume that electricity would stop flowing may be unrealistic, but

[20] Section 316 (b) of the Clean Water Act requires that thermal wastewater discharges do not harm fish and other wildlife.

[21] Today, most utilities participate in large interstate "power pools" and can buy or sell electricity "on the grid" from other utilities or power marketers. Thus, assuming power was available to buy, and assuming that no contractual or physical limitations were in place (e.g., transmission constraints); utilities could offset lost power that resulted from waters shortages with purchases via the power grid.

to maintain consistency, the model assumes that water shortages would result in lost sales of electricity.[22] Another related consideration is that IMPLAN output data report all sales transactions for particular utility in a given county - including sales generated from stations outside a county. As a countermeasure, analysts estimated sales for affected counties using production and price data from the U.S. Energy Information Administration.

The Region M 2006 Water Plan indicates that under drought of record conditions, steam-electric water shortages would occur in Cameron, Hidalgo and Webb counties. Table 20 summarizes estimated impacts. Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin.

Table 20: Annual Economic Impacts of Unmet Water Needs for Steam-electric Water Uses
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Total Sales	Regional Income ($millions)	Jobs	Business Taxes
2010	$0.00	$0.00	0	$0.00
2020	$6.67	$4.48	35	$0.80
2030	$14.73	$9.90	85	$1.77
2040	$49.09	$33.01	275	$5.91
2050	$75.70	$50.91	425	$9.12
2060	$219.23	$146.98	1,230	$26.18

Source: Texas Water Development Board Office of Water Resources Planning.

3. Regional Social Impacts

As discussed previously in Section 1.2, estimated social impacts focus changes including population loss and subsequent related in school enrollment. As shown in Table 19, water shortages in 2010 could result in a population loss of 12,150 people with a corresponding reduction in school enrollment of 3,160. Models indicate that shortages in 2060 could cause population in the region to fall by 53,160 people and school enrollment by 13,790 students.

[22] Losses offset through grid purchases or from peaking plants would likely result in higher production costs, which utilities would ultimately pass on to consumers in the form of higher utility bills. Determining the impacts of higher costs is not considered in this study.

Table 19: Estimated Regional Social Impacts of Unmet Water Needs (years, 2010, 2020, 2030, 2040, 2050 and 2060)		
Year	Population Losses	Declines in School Enrollment
2010	12,150	3,160
2020	16,500	4,280
2030	19,070	4,950
2040	24,770	6,420
2050	34,650	8,980
2060	53,160	13,790
Source: Generated by the Texas Water Development Board, Office of Water Planning.		

Attachment A: Baseline Regional Economic Data

Tables A-1 through A-6 contain data from several sources that form a basis of analyses in this report. Economic statistics were extracted and processed via databases purchased from MIG, Inc. using IMPLAN Pro™ software. Values for gallons per employee (i.e. GED coefficients) for the municipal water use category are based on several secondary sources.[23] County-level data sets along with multipliers are not included given their large sizes (i.e., 528 sectors per county each with 12 different multiplier coefficients). Fields in Tables A-1 through A-6 contain the following variables:

- *GED -* average gallons of water use per employee per day (municipal use only);
- *total sales -* total industry production measured in millions of dollars (equal to shipments plus net additions to inventories);
- *intermediate sales -* sales to other industries in the region measured in millions of dollars;
- *final sales -* all sales to end-users including sales to households in the region and exports out of the region;
- *jobs -* number of full and part-time jobs (annual average) required by a given industry;
- *regional income -* total payroll costs (wages and salaries plus benefits), proprietor income, corporate income, rental income and interest payments;
- *business taxes –* sales taxes, excise taxes, fees, licenses and other taxes paid during normal business operations (includes all payments to federal, state and local government except income taxes).

[23] Sources for GED coefficients include: Gleick, P.H., Haasz, D., Henges-Jeck, C., Srinivasan, V., Wolff, G. Cushing, K.K., and Mann, A. "*Waste Not, Want Not. The Potential for Urban Water Conservation in California*." Pacific Institute. November 2003. U.S. Bureau of the Census. 1982 Census of Manufacturers: Water Use in Manufacturing. USGPO, Washington D.C. See also: "*U.S. Army Engineer Institute for Water Resources, IWR Report 88-R-6.*," Fort Belvoir, VA. See also, Joseph, E. S., 1982, "*Municipal and Industrial Water Demands of the Western United States*." Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, v. 108, no. WR2, p. 204-216. See also, Baumann, D. D., Boland, J. J., and Sims, J. H., 1981, "*Evaluation of Water Conservation for Municipal and Industrial Water Supply*." U.S. Army Corps of Engineers, Institute for Water Resources, Contract no. 82-C1.

Table A-1: Economic Data for Predominant Irrigated Crops in Region M (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Labor Force	Regional Income	Business Taxes
Cotton	$43.13	$3.11	$40.03	342	$11.18	$0.97
Feed Grains	$24.08	$0.99	$23.09	440	$7.92	$0.89
Food Grains	$0.40	$0.13	$0.26	11	$0.10	$0.01
Fruits	$66.93	$1.38	$65.55	1,164	$9.40	$0.56
Hay and Pasture	$9.50	$0.39	$9.11	650	$2.50	$0.25
Miscellaneous Crops	$9.02	$4.33	$4.69	295	$2.89	$0.19
Oil Bearing Crops	$0.00	$0.00	$0.00	0	$0.00	$0.00
Sugar Crops	$53.84	$2.05	$51.79	933	$24.50	$2.11
Tree Nuts	$1.41	$0.02	$1.39	29	$0.45	$0.01
Vegetables	$184.93	$20.06	$164.86	2,109	$55.22	$2.07
Total	$393.24	$32.47	$360.77	5,973	$114.17	$7.05

Table A-2: Economic Data for Livestock Sectors, Region M (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Labor Force	Regional Income	Business Taxes
Cattle Feedlots	$48.18	$41.50	$6.68	359	$35.85	$2.76
Dairy Farm Products	$2.56	$0.09	$2.47	22	$0.76	$0.01
Hogs, Pigs and Swine	$0.84	$0.82	$0.01	16	$0.15	$0.02
Miscellaneous Livestock	$8.13	$4.19	$3.94	304	$0.94	$0.03
Other Meat Animal Products	$0.01	$0.01	$0.00	1	$0.00	$0.00
Poultry and Eggs	$1.76	$0.59	$1.18	15	$0.44	$0.01
Ranch Fed Cattle	$12.17	$11.90	$0.27	354	$3.39	$0.24
Range Fed Cattle	$53.54	$23.16	$30.38	1829	$21.67	$1.39
Sheep, Lambs and Goats	$0.13	$0.12	$0.01	19	$0.04	$0.00
Total	$127.31	$82.37	$44.94	2,918	$63.24	$4.45

Table A-3: Economic Data for Municipal Sectors, Region M (Year 2000)

Sector	GED	Total Sales	Intermediate Sales	Final Sales	Labor Force	Regional Income	Business Taxes
Accounting, Auditing and Bookkeeping	120	$112.66	$96.41	$16.25	2,365	$88.78	$1.01
Advertising	117	$30.79	$29.15	$1.64	325	$14.56	$0.26
Air Transportation	171	$108.61	$17.31	$91.30	1,245	$52.46	$7.50
Amusement and Recreation Services,	427	$70.00	$1.54	$68.46	2,726	$39.62	$3.84
Apparel & Accessory Stores	68	$201.31	$9.10	$192.21	5,520	$111.27	$32.12
Arrangement Of Passenger	130	$39.67	$12.93	$26.74	299	$27.39	$1.19
Automobile Parking and Car Wash	681	$30.52	$2.84	$27.68	975	$20.61	$1.41
Automobile Rental and Leasing	147	$50.25	$36.37	$13.87	525	$29.33	$3.97
Automobile Repair and Services	55	$193.48	$59.98	$133.50	2,725	$94.61	$8.57
Automotive Dealers & Service Stations	49	$542.80	$98.47	$444.34	8,077	$323.70	$83.96
Banking	59	$1,459.40	$313.80	$1,145.60	7,971	$942.85	$23.59
Beauty and Barber Shops	216	$43.90	$3.59	$40.31	1,758	$26.47	$0.52
Bowling Alleys and Pool Halls	86	$2.25	$0.01	$2.24	101	$1.22	$0.20
Building Materials & Gardening	35	$156.80	$17.29	$139.50	3,544	$111.87	$25.79
Business Associations	160	$121.01	$18.09	$102.91	3,187	$81.53	$0.07
Child Day Care Services	120	$127.48	$0.00	$127.48	3,128	$42.97	$1.24
Colleges, Universities, Schools	75	$0.95	$0.01	$0.94	37	$0.60	$0.00
Commercial Sports Except Racing	391	$0.47	$0.26	$0.21	12	$0.31	$0.03
Commodity Credit Corporation	-	$0.00	$0.00	$0.00	0	$0.00	$0.00
Communications, Except Radio and TV	47	$478.42	$211.27	$267.15	1,921	$239.82	$25.53
Computer and Data Processing Services	40	$19.74	$11.89	$7.85	379	$15.97	$0.30
Credit Agencies	156	$242.17	$161.65	$80.52	6,288	$130.99	$8.46
Detective and Protective Services	84	$46.32	$26.08	$20.24	2,181	$34.32	$0.63
Doctors and Dentists	203	$1,136.52	$0.00	$1,136.52	11,597	$758.77	$14.57
Domestic Services	-	$59.65	$59.65	$0.00	7,463	$59.13	$0.00
Dummy	-	$0.00	$0.00	$0.00	0	$0.00	$0.00
Dummy	-	$0.00	$0.00	$0.00	0	$0.00	$0.00

Table A-3: Economic Data for Municipal Sectors, Region M (Year 2000)

Eating & Drinking	157	$947.28	$39.95	$907.34	27,675	$426.48	$59.51
Electrical Repair Service	37	$44.78	$12.47	$32.31	707	$14.74	$1.27
Elementary and Secondary Schools	169	$50.89	$0.00	$50.89	1,979	$32.40	$0.00
Engineering, Architectural Services	87	$122.62	$106.68	$15.94	1,556	$44.57	$0.66
Equipment Rental and Leasing	29	$109.84	$63.47	$46.38	911	$48.18	$3.35
Federal Government - Military	-	$102.68	$102.68	$0.00	3,316	$102.68	$0.00
Federal Government - Non-Military	-	$524.09	$524.09	$0.00	9,027	$524.09	$0.00
Food Stores	98	$508.02	$11.96	$496.06	14,860	$380.86	$81.18
Funeral Service and Crematories	111	$32.00	$0.00	$32.00	1,030	$21.20	$0.91
Furniture & Home Furnishings Stores	42	$126.88	$12.83	$114.04	3,601	$82.33	$19.90
Gas Production and Distribution	51	$172.08	$63.21	$108.87	173	$41.66	$11.53
General Merchandise Stores	47	$418.42	$10.86	$407.56	12,926	$263.12	$66.77
Greenhouse and Nursery Products	-	$79.22	$16.03	$63.19	1,070	$20.94	$0.29
Hospitals	76	$1,002.04	$0.66	$1,001.38	14,103	$639.92	$3.59
Hotels and Lodging Places	230	$239.10	$75.62	$163.48	5,405	$124.39	$16.01
Insurance Agents and Brokers	89	$103.73	$25.62	$78.11	2,509	$80.50	$1.11
Insurance Carriers	136	$100.26	$9.49	$90.77	1,063	$48.43	$4.96
Inventory Valuation Adjustment	-	-$13.13	-$13.13	$0.00	0	-$12.54	$0.00
Job Trainings & Related Services	141	$23.76	$4.25	$19.51	670	$11.37	$0.05
Labor and Civic Organizations	122	$84.85	$0.47	$84.38	6,583	$60.16	$0.01
Landscape and Horticultural Services	-	$26.06	$19.02	$7.04	1,084	$15.18	$0.65
Laundry, Cleaning and Shoe Repair	517	$44.34	$9.85	$34.48	2,057	$32.63	$1.13
Legal Services	76	$256.68	$91.65	$165.03	3,345	$197.58	$2.30
Local Government Passenger Transit	-	$2.22	$0.19	$2.03	39	-$3.30	$0.00
Local, Interurban Passenger Transit	68	$107.60	$9.63	$97.97	2,295	$65.83	$2.36
Maintenance and Repair Oil and Gas	25	$155.03	$35.69	$119.33	1,261	$89.46	$6.10
Maintenance and Repair Other Facilities	25	$404.71	$153.88	$250.83	8,713	$264.95	$1.77
Maintenance and Repair, Residential	25	$338.83	$89.04	$249.79	2,761	$77.84	$1.06
Management and Consulting Services	87	$104.01	$73.29	$30.72	1,189	$54.30	$0.72
Membership Sports and Recreation	427	$40.60	$1.03	$39.56	1,411	$21.03	$1.49
Miscellaneous Personal Services	129	$44.12	$3.09	$41.03	611	$13.35	$1.01
Miscellaneous Repair Shops	124	$32.71	$19.81	$12.90	600	$13.08	$0.82
Miscellaneous Retail	132	$481.41	$35.90	$445.52	12,798	$301.95	$73.55
Motion Pictures	113	$98.40	$58.38	$40.02	1,338	$29.06	$1.02
Motor Freight Transport and	85	$1,427.64	$505.78	$921.85	14,544	$537.42	$16.89
New Government Facilities	63	$560.27	$0.00	$560.27	4,155	$179.74	$2.83
New Highways and Streets	45	$137.08	$0.00	$137.08	1,416	$44.03	$0.72
New Industrial and Commercial	63	$546.41	$0.00	$546.41	5,212	$159.43	$3.30
New Mineral Extraction Facilities	63	$309.26	$3.91	$305.36	6,154	$173.63	$14.01
New Residential Structures	35	$1,092.73	$0.00	$1,092.73	7,439	$161.67	$5.50
New Utility Structures	63	$232.55	$0.00	$232.55	2,548	$80.74	$1.05
Noncomparable Imports	-	$0.00	$0.00	$0.00	0	$0.00	$0.00
Nursing and Protective Care	197	$116.27	$0.00	$116.27	3,800	$83.98	$2.85
Other Business Services	84	$133.07	$126.09	$6.98	1,450	$50.46	$1.83
Other Educational Services	116	$78.57	$7.25	$71.32	1,753	$26.72	$2.00
Other Medical and Health Services	168	$851.23	$24.24	$826.99	25,220	$350.05	$10.93
Other Nonprofit Organizations	122	$41.46	$2.10	$39.36	1,838	$20.10	$0.25
Other State and Local Govt Enterprises	-	$307.13	$75.71	$231.41	1,749	$91.99	$0.00
Owner-occupied Dwellings	89	$1,662.65	$0.00	$1,662.65	0	$1,043.83	$215.59
Personnel Supply Services	484	$186.19	$156.20	$29.99	9,803	$179.30	$3.54
Photofinishing, Commercial	112	$20.19	$13.27	$6.92	221	$6.51	$0.40
Portrait and Photographic Studios	184	$11.46	$0.80	$10.66	301	$5.31	$0.27
Racing and Track Operation	391	$4.88	$0.57	$4.32	89	$1.95	$0.91
Radio and TV Broadcasting	64	$162.58	$142.39	$20.19	1,047	$58.17	$2.14
Railroads and Related Services	68	$69.55	$21.10	$48.46	617	$18.88	$1.00
Real Estate	89	$1,042.74	$413.03	$629.71	5,907	$618.36	$123.37
Religious Organizations	328	$61.24	$0.00	$61.24	471	$9.63	$0.00
Research, Development & Testing	123	$33.30	$12.62	$20.68	667	$15.81	$0.29
Residential Care	111	$33.99	$0.00	$33.99	1,240	$21.10	$0.30
Rest Of The World Industry	-	$0.00	$0.00	$0.00	0	$0.00	$0.00
Sanitary Services and Steam Supply	51	$24.26	$15.63	$8.63	110	$10.14	$4.44
Scrap	-	$0.00	$0.00	$0.00	0	$0.00	$0.00
Security and Commodity Brokers	59	$132.00	$86.03	$45.97	727	$48.65	$4.29
Services To Buildings	67	$57.06	$39.96	$17.10	1,489	$25.70	$1.02
Social Services, N.E.C.	42	$238.64	$20.53	$218.11	5,119	$74.13	$0.22
State & Local Government - Education	-	$1,846.08	$1,846.08	$0.00	57,306	$1,846.08	$0.00
State & Local Government - Non-	-	$800.33	$800.33	$0.00	20,078	$800.33	$0.00
Theatrical Producers, Bands Etc.	36	$5.23	$3.14	$2.08	87	$1.38	$0.12
Transportation Services	40	$825.89	$114.79	$711.10	9,049	$616.79	$7.15
U.S. Postal Service	-	$125.53	$80.59	$44.95	1,958	$86.86	$0.00
Used and Secondhand Goods	-	$0.00	$0.00	$0.00	0	$0.00	$0.00
Watch, Clock, Jewelry and Furniture	50	$4.48	$0.04	$4.45	76	$1.67	$0.23
Water Supply and Sewerage Systems	51	$38.64	$7.04	$31.60	221	$21.05	$2.62
Water Transportation	353	$78.98	$30.09	$48.90	412	$11.39	$1.01
Wholesale Trade	43	$1,346.56	$628.46	$718.10	17,419	$735.25	$191.27
Total	na	$26,837.45	$6,187.05	$20,650.41	434,714	$15,595.83	$1,232.20

NEC = not elsewhere classified. "na" = not available.

Table A-4: Economic Data for Manufacturing Sectors, Region M (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Labor Force	Regional Income	Business Taxes
Abrasive Products	$48.35	$1.77	$46.59	237	$16.49	$0.62
Agricultural Chemicals, N.E.C	$1.38	$0.58	$0.80	5	$0.81	$0.02
Agricultural, Forestry, Fishery Services	$118.45	$62.89	$55.55	7791	$61.27	$2.70
Aircraft	$31.84	$0.95	$30.89	109	$9.98	$0.40
Aircraft and Missile Engines and Parts	$51.98	$9.71	$42.27	258	$14.92	$0.38
Aircraft and Missile Equipment,	$0.31	$0.00	$0.30	3	$0.09	$0.00
Alkalies & Chlorine	$1.87	$1.05	$0.82	11	$0.72	$0.03
Aluminum Foundries	$2.80	$0.14	$2.66	22	$1.23	$0.03
Animal and Marine Fats and Oils	$2.76	$0.34	$2.42	11	$0.72	$0.02
Apparel Made From Purchased Materials	$919.98	$21.20	$898.78	8766	$216.66	$3.56
Architectural Metal Work	$8.86	$0.29	$8.58	105	$4.62	$0.08
Asphalt Felts and Coatings	$21.63	$13.89	$7.75	75	$14.52	$0.20
Automatic Temperature Controls	$0.30	$0.26	$0.04	5	$0.15	$0.00
Automotive and Apparel Trimmings	$11.27	$8.60	$2.66	86	$1.50	$0.04
Automotive Stampings	$1.65	$0.30	$1.36	10	$0.37	$0.01
Bags, Paper	$28.14	$0.26	$27.88	166	$8.49	$0.27
Bags, Plastic	$41.97	$0.39	$41.58	226	$11.22	$0.37
Blast Furnaces and Steel Mills	$1.46	$0.45	$1.01	5	$0.15	$0.01
Blended and Prepared Flour	$0.37	$0.00	$0.37	1	$0.04	$0.00
Blinds, Shades, and Drapery Hardware	$1.68	$0.00	$1.68	23	$0.64	$0.01
Blowers and Fans	$0.87	$0.01	$0.86	10	$0.29	$0.01
Boat Building and Repairing	$3.26	$0.02	$3.24	34	$0.81	$0.02
Book Publishing	$6.86	$0.58	$6.28	22	$3.05	$0.11
Bottled and Canned Soft Drinks & Water	$103.96	$0.42	$103.53	318	$19.27	$0.70
Brass, Bronze, and Copper Foundries	$2.91	$0.14	$2.78	76	$1.73	$0.03
Bread, Cake, and Related Products	$34.02	$9.86	$24.16	182	$13.46	$0.23
Broadwoven Fabric Mills and Finishing	$0.26	$0.22	$0.04	2	$0.08	$0.00
Brooms and Brushes	$2.90	$0.16	$2.75	32	$1.30	$0.04
Canned Fruits and Vegetables	$54.39	$0.25	$54.14	292	$11.96	$0.27
Canned Specialties	$3.37	$0.02	$3.35	9	$0.74	$0.02
Canvas Products	$9.21	$3.74	$5.47	150	$3.66	$0.05
Carbon and Graphite Products	$0.52	$0.10	$0.42	4	$0.14	$0.00
Chemical Preparations, N.E.C	$1.79	$1.20	$0.59	5	$0.55	$0.02
Clay Refractories	$0.33	$0.00	$0.33	3	$0.12	$0.00
Cold Finishing Of Steel Shapes	$2.41	$0.74	$1.66	12	$0.57	$0.02
Commercial Fishing	$32.56	$4.52	$28.04	1131	$29.54	$1.02
Commercial Printing	$30.77	$20.14	$10.63	315	$7.71	$0.23
Communications Equipment N.E.C.	$0.39	$0.24	$0.15	5	$0.22	$0.00
Concrete Block and Brick	$8.61	$0.06	$8.55	51	$3.09	$0.14
Concrete Products, N.E.C	$15.76	$0.08	$15.69	145	$4.74	$0.18
Construction Machinery and Equipment	$0.49	$0.02	$0.46	2	$0.08	$0.00
Converted Paper Products, N.E.C	$0.70	$0.01	$0.69	4	$0.16	$0.01
Conveyors and Conveying Equipment	$11.67	$2.02	$9.66	75	$3.83	$0.09
Cordage and Twine	$3.24	$0.05	$3.19	36	$0.62	$0.02
Costume Jewelery	$2.69	$0.02	$2.66	15	$1.76	$0.03
Cottonseed Oil Mills	$44.44	$4.49	$39.96	117	$5.03	$0.29
Curtains and Draperies	$10.89	$1.41	$9.48	123	$2.72	$0.06
Cut Stone and Stone Products	$0.13	$0.00	$0.13	2	$0.05	$0.00
Dental Equipment and Supplies	$5.38	$2.89	$2.49	30	$0.98	$0.04
Drugs	$5.40	$1.66	$3.73	35	$2.65	$0.06
Electric Lamps	$0.16	$0.00	$0.16	2	$0.09	$0.00
Electrical Equipment, N.E.C.	$15.90	$1.51	$14.39	84	$1.90	$0.05
Electron Tubes	$0.16	$0.11	$0.05	1	$0.04	$0.00
Electronic Components, N.E.C.	$234.97	$70.74	$164.23	933	$47.00	$1.66
Engine Electrical Equipment	$43.99	$16.11	$27.88	297	$13.67	$0.34
Fabricated Metal Products, N.E.C.	$0.64	$0.18	$0.45	5	$0.19	$0.00
Fabricated Plate Work (Boiler Shops)	$2.87	$0.04	$2.83	36	$1.46	$0.03
Fabricated Rubber Products, N.E.C.	$16.37	$0.18	$16.19	108	$5.16	$0.12
Fabricated Structural Metal	$47.57	$1.18	$46.39	335	$14.80	$0.38
Fabricated Textile Products, N.E.C.	$8.50	$2.23	$6.28	42	$3.83	$0.09
Farm Machinery and Equipment	$16.77	$5.61	$11.16	116	$2.38	$0.06
Fertilizers, Mixing Only	$2.45	$0.49	$1.96	6	$0.67	$0.04
Flavoring Extracts and Syrups, N.E.C.	$0.55	$0.06	$0.49	7	$0.37	$0.00
Flour and Other Grain Mill Products	$95.83	$0.50	$95.34	312	$12.51	$0.42
Fluid Milk	$24.46	$1.17	$23.29	63	$4.99	$0.22
Fluid Power Cylinders & Actuators	$2.06	$0.03	$2.03	11	$0.46	$0.01
Food Preparations, N.E.C	$115.51	$0.45	$115.07	729	$24.17	$0.52
Food Products Machinery	$1.34	$0.52	$0.81	15	$0.56	$0.01
Footwear Cut Stock	$1.53	$0.01	$1.52	7	$0.78	$0.02
Forest Products	$0.08	$0.00	$0.08	2	$0.02	$0.00
Forestry Products	$1.05	$0.00	$1.05	14	$0.80	$0.16
Frozen Fruits, Juices and Vegetables	$80.02	$0.83	$79.19	421	$12.52	$0.41
Frozen Specialties	$1.93	$0.02	$1.91	13	$0.41	$0.01

Table A-4: Economic Data for Manufacturing Sectors, Region M (Year 2000)

Furniture and Fixtures, N.E.C	$0.49	$0.25	$0.24	2	$0.12	$0.00
General Industrial Machinery, N.E.C	$0.51	$0.01	$0.50	3	$0.10	$0.00
House Slippers	$33.82	$0.01	$33.81	340	$20.54	$0.30
Housefurnishings, N.E.C	$38.75	$4.41	$34.34	221	$16.74	$0.40
Household Cooking Equipment	$1.34	$0.01	$1.33	8	$0.28	$0.01
Household Furniture, N.E.C	$3.67	$0.35	$3.32	55	$1.02	$0.01
Industrial and Fluid Valves	$63.77	$7.14	$56.63	270	$16.95	$0.50
Industrial Gases	$1.05	$0.59	$0.46	21	$0.81	$0.02
Industrial Machines N.E.C.	$27.76	$0.22	$27.54	314	$9.50	$0.19
Industrial Patterns	$0.10	$0.00	$0.10	2	$0.05	$0.00
Inorganic Chemicals Nec.	$36.35	$20.45	$15.90	137	$16.09	$1.06
Instruments To Measure Electricity	$0.57	$0.03	$0.54	4	$0.10	$0.00
Iron and Steel Forgings	$0.69	$0.12	$0.57	6	$0.28	$0.01
Iron and Steel Foundries	$0.37	$0.01	$0.36	3	$0.09	$0.00
Jewelry, Precious Metal	$9.62	$0.03	$9.59	36	$5.36	$0.13
Leather Goods, N.E.C	$1.32	$0.19	$1.13	34	$1.00	$0.01
Machine Tools, Metal Cutting Types	$0.66	$0.20	$0.45	10	$0.23	$0.00
Malt Beverages	$0.50	$0.05	$0.45	3	$0.15	$0.08
Manufactured Ice	$2.36	$0.13	$2.23	68	$1.26	$0.01
Manufacturing Industries, N.E.C.	$41.19	$1.47	$39.72	444	$16.04	$0.40
Meat Packing Plants	$131.59	$14.89	$116.70	357	$8.12	$0.58
Metal Coating and Allied Services	$0.35	$0.10	$0.25	2	$0.14	$0.00
Metal Doors, Sash, and Trim	$3.43	$0.18	$3.25	40	$1.11	$0.02
Metal Household Furniture	$2.50	$0.33	$2.17	23	$0.45	$0.01
Metal Stampings, N.E.C.	$20.60	$2.50	$18.10	115	$8.44	$0.20
Millwork	$34.44	$27.82	$6.61	359	$11.75	$0.29
Minerals, Ground Or Treated	$2.50	$0.01	$2.49	14	$1.18	$0.03
Miscellaneous Fabricated Wire Products	$3.82	$1.26	$2.55	35	$1.74	$0.03
Miscellaneous Plastics Products	$142.61	$2.25	$140.36	890	$33.01	$0.77
Miscellaneous Publishing	$7.20	$4.85	$2.34	61	$3.43	$0.08
Mobile Homes	$0.14	$0.00	$0.14	1	$0.05	$0.00
Motor Vehicle Parts and Accessories	$258.50	$39.49	$219.01	1083	$74.67	$1.02
Motor Vehicles	$3.50	$0.01	$3.49	6	$0.58	$0.01
Motors and Generators	$45.64	$3.63	$42.00	362	$18.32	$0.52
Narrow Fabric Mills	$4.92	$2.10	$2.82	88	$1.96	$0.04
Newspapers	$68.74	$47.79	$20.95	1011	$27.02	$0.62
Nonferrous Wire Drawing and Insulating	$2.30	$0.31	$1.98	9	$0.38	$0.01
Nonmetallic Mineral Products, N.E.C.	$2.76	$0.06	$2.70	32	$1.10	$0.03
Oil Field Machinery	$1.15	$0.20	$0.96	13	$0.31	$0.01
Packaging Machinery	$13.76	$2.51	$11.25	84	$4.03	$0.11
Paints and Allied Products	$4.13	$0.08	$4.04	12	$1.44	$0.04
Paper Coated & Laminated N.E.C.	$7.56	$0.43	$7.14	35	$3.10	$0.07
Paper Mills, Except Building Paper	$1.37	$0.01	$1.36	6	$0.25	$0.01
Paperboard Containers and Boxes	$120.72	$71.48	$49.24	546	$33.18	$1.25
Paving Mixtures and Blocks	$24.42	$18.36	$6.06	81	$9.46	$0.18
Periodicals	$1.33	$0.76	$0.57	7	$0.59	$0.01
Personal Leather Goods	$0.19	$0.01	$0.18	2	$0.12	$0.00
Petroleum Refining	$19.95	$8.84	$11.10	8	$1.60	$0.11
Photographic Equipment and Supplies	$2.11	$0.26	$1.85	8	$0.28	$0.01
Pickles, Sauces, and Salad Dressings	$2.22	$0.05	$2.17	7	$0.76	$0.01
Pipe, Valves, and Pipe Fittings	$0.79	$0.09	$0.70	7	$0.30	$0.01
Plating and Polishing	$0.33	$0.09	$0.24	4	$0.26	$0.00
Pleating and Stitching	$0.12	$0.10	$0.03	2	$0.08	$0.00
Potato Chips & Similar Snacks	$17.20	$0.49	$16.71	66	$4.28	$0.10
Poultry Processing	$0.42	$0.05	$0.38	3	$0.09	$0.00
Power Transmission Equipment	$0.89	$0.01	$0.88	6	$0.26	$0.01
Prefabricated Metal Buildings	$0.84	$0.02	$0.81	7	$0.34	$0.01
Prepared Fresh Or Frozen Fish Or Seafood	$121.88	$0.79	$121.09	807	$17.09	$0.62
Printed Circuit Boards	$5.36	$1.61	$3.74	97	$2.50	$0.03
Printing Trades Machinery	$0.43	$0.13	$0.30	3	$0.09	$0.00
Public Building Furniture	$0.62	$0.41	$0.21	4	$0.13	$0.00
Radio and Tv Communication Equipment	$0.33	$0.21	$0.13	1	$0.10	$0.00
Radio and TV Receiving Sets	$14.16	$1.11	$13.06	69	$6.25	$0.18
Ready-mixed Concrete	$95.26	$0.78	$94.47	688	$27.72	$1.12
Refrigeration and Heating Equipment	$3.17	$2.14	$1.03	17	$0.61	$0.02
Relays & Industrial Controls	$31.28	$4.67	$26.60	185	$10.47	$0.25
Sausages and Other Prepared Meats	$47.03	$6.04	$41.00	215	$8.33	$0.32
Sawmills and Planing Mills, General	$0.68	$0.64	$0.03	4	$0.18	$0.01
Screw Machine Products and Bolts, Etc.	$0.29	$0.14	$0.15	2	$0.12	$0.00
Secondary Nonferrous Metals	$11.95	$0.13	$11.82	32	$1.87	$0.13
Semiconductors and Related Devices	$0.64	$0.55	$0.09	4	$0.22	$0.00
Service Industry Machines, N.E.C.	$0.44	$0.18	$0.26	3	$0.10	$0.00
Sheet Metal Work	$14.57	$0.37	$14.20	122	$5.22	$0.11
Ship Building and Repairing	$116.86	$0.09	$116.78	1180	$45.22	$0.86
Shoes, Except Rubber	$5.45	$0.03	$5.42	81	$2.18	$0.04
Shortening and Cooking Oils	$1.46	$0.37	$1.09	2	$0.26	$0.01
Signs and Advertising Displays	$14.48	$5.77	$8.71	170	$6.22	$0.14

Table A-4: Economic Data for Manufacturing Sectors, Region M (Year 2000)

Small Arms	$9.16	$0.02	$9.13	147	$6.62	$0.87
Soap and Other Detergents	$1.67	$0.23	$1.44	12	$0.88	$0.02
Special Dies and Tools and Accessories	$28.90	$7.51	$21.39	384	$13.48	$0.22
Special Industry Machinery N.E.C.	$72.56	$4.69	$67.87	202	$8.51	$0.25
Sporting and Athletic Goods, N.E.C.	$10.35	$0.05	$10.29	84	$4.15	$0.35
Steam Engines and Turbines	$0.48	$0.18	$0.29	2	$0.08	$0.00
Storage Batteries	$0.51	$0.16	$0.35	3	$0.11	$0.00
Sugar	$2.74	$0.02	$2.71	7	$0.22	$0.01
Surgical and Medical Instrument	$26.44	$10.34	$16.10	162	$6.08	$0.21
Synthetic Rubber	$0.79	$0.55	$0.24	3	$0.23	$0.01
Telephone and Telegraph Apparatus	$0.80	$0.55	$0.25	2	$0.12	$0.00
Thread Mills	$0.23	$0.11	$0.13	5	$0.04	$0.00
Toilet Preparations	$35.60	$1.01	$34.59	106	$15.35	$0.32
Transformers	$0.40	$0.05	$0.35	4	$0.12	$0.00
Transportation Equipment, N.E.C	$1.64	$0.03	$1.62	7	$0.27	$0.01
Typesetting	$0.65	$0.14	$0.50	7	$0.26	$0.01
Upholstered Household Furniture	$2.86	$0.02	$2.84	38	$0.75	$0.01
Wood Household Furniture	$13.31	$0.32	$12.99	166	$4.20	$0.08
Wood Kitchen Cabinets	$19.02	$16.14	$2.88	288	$7.16	$0.14
Wood Pallets and Skids	$24.03	$9.02	$15.01	314	$10.22	$0.22
Wood Preserving	$0.67	$0.65	$0.02	2	$0.10	$0.00
Wood Products, N.E.C	$5.67	$2.12	$3.55	62	$1.72	$0.05
Yarn Mills and Finishing Of Textiles, N.E.C.	$0.18	$0.17	$0.01	1	$0.04	$0.00
Total	$4,376.79	$647.42	$3,729.36	37781	$1,210.74	$32.99

NEC = not elsewhere classified. “na” = not available.

Table A-5: Economic Data for Mining Sectors, Region M (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Labor Force	Regional Income	Business Taxes
Chemical, Fertilizer Mineral Mining	$0.81	$0.22	$0.60	8	$0.53	$0.04
Clay, Ceramic, Refractory Minerals	$0.44	$0.00	$0.44	2	$0.26	$0.01
Coal Mining	$0.66	$0.15	$0.52	2	$0.20	$0.08
Dimension Stone	$1.76	$0.03	$1.73	14	$1.07	$0.05
Natural Gas & Crude Petroleum	$357.87	$95.11	$262.77	841	$159.59	$18.73
Natural Gas Liquids	$202.42	$53.79	$148.62	170	$51.62	$8.12
Sand and Gravel	$8.22	$0.20	$8.02	79	$5.12	$0.26
Uranium-radium-vanadium Ores	$1.06	$0.76	$0.29	42	$0.12	$0.04
Total	$573.25	$150.26	$422.99	1,158	$218.51	$27.32

Table A-6: Economic Data for the Steam Electric Sector, Region M (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Labor Force	Regional Income	Business Taxes
Electric Services	$321.78	$57.42	$264.36	591	$230.12	$41.22
State and Local Electric Utilities	$32.33	$5.73	$26.60	70	$12.03	$0.00
Total	$354.12	$63.15	$290.97	661	$242.15	$41.22

na = “not available”

Attachment B: Distribution of Economic Impacts by County and Water User Group

Tables B-1 through B-9 show economic impacts by county and water user group; however, caution is warranted. Figures shown for specific counties are *direct* impacts only. For the most part, figures reported in the main text for all water use categories uses include *direct and secondary* impacts. Secondary effects were estimated using regional level multipliers that treat each regional water planning area as an aggregate and autonomous economy. Multipliers do not specify where secondary impacts will occur at a sub-regional level (i.e., in which counties or cities). All economic impacts that would accrue to a region as a whole due to secondary economic effects are reported in Tables B-1 through B-9 as "secondary regional level impacts."

For example, assume that in a given county (or city) water shortages caused significant reductions in output for a manufacturing plant. Reduced output resulted in lay-offs and lost income for workers and owners of the plant. This is a *direct* impact. Direct impacts were estimated at a county level; and thus one can say with certainty that direct impacts occurred in that county. However, secondary impacts accrue to businesses and households throughout the region where the business operates, and it is impossible using input-output models to determine where these businesses are located spatially.

The same logic applies to changes in population and school enrollment. Since employment losses and subsequent out-migration from a region were estimated using *direct* and *secondary* multipliers, it is impossible to say with any degree of certainty how many people a given county would lose regardless of whether the economic impact was direct or secondary. For example, assume the manufacturing plant referred to above is in County A. If the firm eliminated 50 jobs, one could state with certainty that water shortages in County A resulted in a loss of 50 jobs in that county. However, one could not unequivocally say whether 100 percent of the population loss due to lay-offs at the manufacturing would accrue to County A because many affected workers might commute from adjacent counties. This is particularly true in large metropolitan areas that overlay one or counties. Thus, population and school enrollment impacts cannot be reported at a county level.

Irrigation

Table B-1: Distribution of Economic Impacts by County and Water User Groups: (Irrigation)						
Lost Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$33.04	$29.80	$25.47	$29.02	$29.02	$29.02
Secondary Regional Level Impacts	$21.04	$18.97	$16.22	$18.48	$18.48	$18.48
Hidalgo						
Direct	$46.99	$30.62	$32.94	$32.94	$32.94	$32.94
Secondary Regional Level Impacts	$33.74	$21.99	$23.66	$23.66	$23.66	$23.66
Maverick						
Direct	$2.65	$1.73	$1.86	$1.86	$1.86	$1.86
Secondary Regional Level Impacts	1.9541	1.2735	1.3701	1.3701	1.3701	1.3701
Starr						
Direct	$3.40	$3.14	$2.87	$2.87	$2.87	$2.87
Secondary Regional Level Impacts	$2.50	$2.31	$2.11	$2.11	$2.11	$2.11
Webb						
Direct	$1.52	$1.41	$1.30	$1.32	$1.32	$1.32
Secondary Regional Level Impacts	$1.13	$1.04	$0.96	$0.98	$0.98	$0.98
Willacy						
Direct	$2.40	$2.20	$2.00	$2.04	$2.04	$2.04
Secondary Regional Level Impacts	$1.70	$1.56	$1.42	$1.45	$1.45	$1.45
Zapata						
Direct	$1.84	$2.41	$2.53	$2.61	$2.61	$2.61
Secondary Regional Level Impacts	$1.37	$1.79	$1.88	$1.93	$1.93	$1.93
Total	$155.27	$120.26	$116.59	$122.64	$122.64	$122.64
Lost Income ($millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$10.08	$9.09	$7.78	$8.86	$8.86	$8.86
Secondary Regional Level Impacts	$11.20	$10.10	$8.64	$9.84	$9.84	$9.84
Hidalgo						
Direct	$13.39	$8.73	$9.39	$9.39	$9.39	$9.39
Secondary Regional Level Impacts	$17.97	$11.71	$12.60	$12.60	$12.60	$12.60
Maverick						
Direct	$0.76	$0.49	$0.53	$0.53	$0.53	$0.53
Secondary Regional Level Impacts	1.0376	0.676	0.728	0.728	0.728	0.728
Starr						
Direct	0.9903	0.915	0.836	0.836	0.836	0.836
Secondary Regional Level Impacts	1.3351	1.234	1.127	1.127	1.127	1.127
Webb						
Direct	$0.46	$0.42	$0.39	$0.40	$0.40	$0.40
Secondary Regional Level Impacts	$0.60	$0.56	$0.51	$0.52	$0.52	$0.52
Willacy						
Direct	$0.50	$0.46	$0.42	$0.42	$0.42	$0.42
Secondary Regional Level Impacts	$0.90	$0.83	$0.75	$0.77	$0.77	$0.77
Zapata						
Direct	$0.55	$0.72	$0.76	$0.78	$0.78	$0.78
Secondary Regional Level Impacts	$0.73	$0.96	$1.00	$1.03	$1.03	$1.03
Total	$60.51	$46.90	$45.45	$47.83	$47.83	$47.83
Lost Jobs						
	2010	2020	2030	2040	2050	2060
Cameron						
Direct	490	442	378	430	430	430
Secondary Regional Level Impacts	514	464	397	452	452	452
Hidalgo						
Direct	607	396	426	426	426	426

Secondary Regional Level Impacts	891	581	625	625	625	625
Maverick						
Direct	38	25	26	26	26	26
Secondary Regional Level Impacts	51	33	36	36	36	36
Starr						
Direct	42	38	35	35	35	35
Secondary Regional Level Impacts	67	62	57	57	57	57
Webb						
Direct	18	16	15	15	15	15
Secondary Regional Level Impacts	30	28	26	26	26	26
Willacy						
Direct	35	32	29	29	29	29
Secondary Regional Level Impacts	44	40	36	37	37	37
Zapata						
Direct	21	28	29	30	30	30
Secondary Regional Level Impacts	37	49	51	52	52	52
Total	2,884	2,233	2,165	2,277	2,277	2,277

Lost Business Taxes ($millions)

County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$0.76	$0.69	$0.59	$0.67	$0.67	$0.67
Secondary Regional Level Impacts	$0.46	$0.41	$0.35	$0.40	$0.40	$0.40
Hidalgo						
Direct	$0.65	$0.42	$0.45	$0.45	$0.45	$0.45
Secondary Regional Level Impacts	$0.84	$0.55	$0.59	$0.59	$0.59	$0.59
Maverick						
Direct	$0.03	$0.02	$0.02	$0.02	$0.02	$0.02
Secondary Regional Level Impacts	0.042	0.027	0.029	0.029	0.029	0.029
Starr						
Direct	$0.04	$0.04	$0.03	$0.03	$0.03	$0.03
Secondary Regional Level Impacts	$0.05	$0.05	$0.04	$0.04	$0.04	$0.04
Webb						
Direct	$0.02	$0.02	$0.01	$0.01	$0.01	$0.01
Secondary Regional Level Impacts	$0.02	$0.02	$0.02	$0.02	$0.02	$0.02
Willacy						
Direct	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03
Secondary Regional Level Impacts	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03
Zapata						
Direct	$0.02	$0.03	$0.03	$0.03	$0.03	$0.03
Secondary Regional Level Impacts	$0.03	$0.04	$0.04	$0.04	$0.04	$0.04
Total	$3.03	$2.37	$2.27	$2.41	$2.41	$2.41

Source: Texas Water Development Board, Office of Water Resources Planning

Livestock

Given the relatively small amount of unmet needs for livestock water uses, this study assumed that ranchers would haul water in by truck to fill stock tanks. Costs reflect water transportation costs.

Table B-2: Projected Costs to Livestock Producers						
County	2010	2020	2030	2040	2050	2060
Maverick	$0.67	$0.67	$0.67	$0.67	$0.67	$0.67
Cameron	$0.65	$0.65	$0.65	$0.65	$0.65	$0.65
Webb	$0.39	$0.39	$0.39	$0.39	$0.39	$0.39
Total	$1.71	$1.71	$1.71	$1.71	$1.71	$1.71
Source: Texas Water Development Board, Office of Water Resources Planning						

Manufacturing

Table B-3: Distribution of Economic Impacts by County and Water User Groups: (Manufacturing)						
Lost Output (Total Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$96.94	$238.25	$399.30	$318.21	$352.67	$399.30
Secondary Regional Level Impacts	$51.28	$126.02	$211.21	$168.32	$186.55	$211.21
Hidalgo						
Direct	$0.00	$0.00	$31.42	$0.00	$13.49	$31.42
Secondary Regional Level Impacts	$0.00	$0.00	$22.27	$0.00	$9.56	$22.27
Willacy						
Direct	$8.95	$8.95	$8.95	$8.95	$8.95	$8.95
Secondary Regional Level Impacts	$4.48	$4.48	$4.48	$4.48	$4.48	$4.48
Total	$161.65	$377.71	$677.63	$499.97	$575.70	$677.63
Lost Income ($millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	524	1,288	1,505	1,720	1,907	2,159
Secondary Regional Level Impacts	731	1,797	2,100	2,400	2,660	3,012
Hidalgo						
Direct	0	0	0	0	58	134
Secondary Regional Level Impacts	0	0	0	0	139	323
Willacy						
Direct	85	85	85	85	85	85
Secondary Regional Level Impacts	63	63	63	63	63	63
Total	1,255	3,085	3,606	4,121	4,763	5,628
Lost Jobs (numbers may not sum to figures in text due to rounding)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$20.02	$49.20	$57.50	$65.72	$72.83	$82.46
Secondary Regional Level Impacts	$27.59	$67.80	$79.24	$90.56	$100.37	$113.64
Hidalgo						
Direct	$0.00	$0.00	$0.00	$0.00	$2.15	$5.01

	2010	2020	2030	2040	2050	2060
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$5.27	$12.27
Willacy						
Direct	$2.11	$2.11	$2.11	$2.11	$2.11	$2.11
Secondary Regional Level Impacts	$2.57	$2.57	$2.57	$2.57	$2.57	$2.57
Total	$47.61	$117.01	$136.74	$156.28	$180.62	$213.37
Lost Business Taxes ($millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$0.72	$1.78	$2.08	$2.38	$2.64	$2.99
Secondary Regional Level Impacts	$1.10	$2.71	$3.16	$3.62	$4.01	$4.54
Hidalgo						
Direct	$0.00	$0.00	$0.00	$0.00	$0.07	$0.16
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.22	$0.51
Willacy						
Direct	$0.03	$0.03	$0.03	$0.03	$0.03	$0.03
Secondary Regional Level Impacts	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04
Total	$1.83	$4.49	$5.25	$6.00	$6.94	$8.20
Source: Texas Water Development Board, Office of Water Resources Planning						

Mining

Table B-4: Distribution of Economic Impacts by County and Water User Groups: (Mining)						
Lost Output (Total Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Willacy						
Direct	$1.25	$1.25	$1.25	$1.25	$1.25	$1.25
Secondary Regional Level Impacts	$0.82	$0.82	$0.82	$0.82	$0.82	$0.82
Total	$2.07	$2.07	$2.07	$2.07	$2.07	$2.07
Lost Income ($millions)						
County	2010	2020	2030	2040	2050	2060
Willacy						
Direct	$0.61	$0.61	$0.61	$0.61	$0.61	$0.61
Secondary Regional Level Impacts	$0.47	$0.47	$0.47	$0.47	$0.47	$0.47
Total	$1.08	$1.08	$1.08	$1.08	$1.08	$1.08
Lost Jobs (numbers may not sum to figures in text due to rounding)						
County	2010	2020	2030	2040	2050	2060
Willacy						
Direct	3	3	3	3	3	3
Secondary Regional Level Impacts	8	8	8	8	8	8
Total	11	11	11	11	11	11
Lost Business Taxes ($millions)						
County	2010	2020	2030	2040	2050	2060
Willacy						
Direct	$0.01	$0.01	$0.01	$0.01	$0.01	$0.01
Secondary Regional Level Impacts	$0.01	$0.01	$0.01	$0.01	$0.01	$0.01
Total	$0.02	$0.02	$0.02	$0.02	$0.02	$0.00
Source: Texas Water Development Board, Office of Water Resources Planning						

Municipal

Impacts to the horticultural industry were estimated at the regional level only and are not included in the tables below.

Table B-5: Lost Water Utility Revenues (Municipal)

County	2010	2020	2030	2040	2050	2060
Cameron	$12.83	$26.76	$41.49	$57.57	$74.76	$92.82
Hidalgo	$3.66	$14.18	$36.47	$65.93	$104.13	$144.42
Jim Hogg	$0.01	$0.01	$0.01	$0.01	$0.01	$0.01
Maverick	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Starr	$0.52	$1.21	$2.14	$3.04	$4.00	$4.98
Webb	$7.12	$25.80	$47.67	$72.03	$98.49	$127.18
Willacy	$0.00	$0.00	$0.00	$0.14	$0.38	$0.56
Zapata	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total	$24.13	$67.96	$127.79	$198.72	$281.78	$369.96

Source: Texas Water Development Board, Office of Water Resources Planning

Table B-6: Lost Water Utility Taxes (Municipal)

County	2010	2020	2030	2040	2050	2060
Cameron	$0.23	$0.47	$0.73	$1.01	$1.32	$1.63
Hidalgo	$0.06	$0.25	$0.64	$1.16	$1.83	$2.54
Jim Hogg	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Maverick	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Starr	$0.01	$0.02	$0.04	$0.05	$0.07	$0.09
Webb	$0.13	$0.45	$0.84	$1.27	$1.73	$2.24
Willacy	$0.00	$0.00	$0.00	$0.00	$0.01	$0.01
Zapata	$0.00	$0.00	$0.00	$0.00	$0.01	$0.01
Total	$0.42	$1.20	$2.25	$3.50	$4.97	$6.52

Source: Texas Water Development Board, Office of Water Resources Planning

Table B-7: Impacts Associated with Unmet Needs for Domestic Water Uses						
County	2010	2020	2030	2040	2050	2060
Cameron	$33.82	$65.67	$100.51	$140.75	$200.85	$284.81
Hidalgo	$10.65	$43.02	$106.90	$191.79	$319.11	$460.36
Jim Hogg	$0.20	$0.21	$0.23	$0.24	$0.23	$0.21
Maverick	$0.73	$2.35	$3.80	$5.09	$6.23	$7.29
Starr	$1.14	$2.68	$4.88	$7.05	$9.38	$12.71
Webb	$16.25	$57.94	$106.82	$172.15	$276.09	$398.16
Willacy	$0.00	$0.00	$0.10	$0.49	$1.09	$1.53
Zapata	$1.68	$2.86	$4.29	$5.68	$7.05	$9.97
Total	$64.47	$174.74	$327.52	$523.23	$820.03	$1,175.05
Source: Texas Water Development Board, Office of Water Resources Planning						

Table B-8: Distribution of Economic Impacts by County and Water User Groups: (Commercial Water Uses)						
Lost Output (Total Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$8.04	$9.68	$28.43	$32.64	$36.86	$40.87
Secondary Regional Level Impacts	$5.32	$6.40	$18.79	$21.58	$24.37	$27.02
Hidalgo						
Direct	$0.00	$0.00	$36.19	$43.28	$66.07	$76.10
Secondary Regional Level Impacts	$0.00	$0.00	$23.78	$28.45	$43.43	$50.02
Webb						
Direct	$0.00	$0.00	$0.00	$29.16	$148.05	$299.14
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$19.31	$98.01	$198.03
Total	$13.36	$16.08	$107.19	$174.41	$416.78	$691.18
Lost Income ($millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$4.07	$4.89	$14.37	$16.50	$18.63	$20.66
Secondary Regional Level Impacts	$2.96	$3.56	$10.47	$12.02	$13.58	$15.05
Hidalgo						
Direct	$0.00	$0.00	$18.01	$21.54	$32.88	$37.87
Secondary Regional Level Impacts	$0.00	$0.00	$13.21	$15.80	$24.13	$27.79
Webb						
Direct	$0.00	$0.00	$0.00	$16.53	$83.94	$169.61
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$11.27	$57.21	$115.61
Total	$7.03	$8.46	$56.06	$93.67	$230.37	$386.59
Lost Jobs (numbers may not sum to figures in text due to rounding)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	247	297	874	1,003	1,133	1,256
Secondary Regional Level Impacts	81	97	286	328	371	411
Hidalgo						
Direct	0	0	1,111	1,328	2,028	2,336
Secondary Regional Level Impacts	0	0	362	433	661	762
Webb						
Direct	0	0	0	622	3,157	6,378
Secondary Regional Level Impacts	0	0	0	299	1,516	3,064
Total	328	395	2,632	4,013	8,866	14,207

Lost Business Taxes ($millions)						
County	2010	2020	2030	2040	2050	2060
Cameron						
Direct	$0.47	$0.56	$1.65	$1.89	$2.13	$2.37
Secondary Regional Level Impacts	$0.35	$0.42	$1.25	$1.43	$1.62	$1.79
Hidalgo						
Direct	$0.00	$0.00	$2.11	$2.52	$3.85	$4.43
Secondary Regional Level Impacts	$0.00	$0.00	$1.60	$1.91	$2.91	$3.35
Webb						
Direct	$0.00	$0.00	$0.00	$1.14	$5.80	$11.71
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.85	$4.30	$8.69
Total	$0.82	$0.98	$6.60	$9.74	$20.61	$32.35
Source: Texas Water Development Board, Office of Water Resources Planning						

Steam Electric

Table B-9: Distribution of Economic Impacts by County and Water User Groups: (Steam-electric)						
Lost Output (Total Sales, $millions)						
Cameron	2010	2020	2030	2040	2050	2060
Direct	$0.00	$0.00	$0.00	$0.00	$0.00	$6.27
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$2.47
Hidalgo						
Direct	$0.00	$4.92	$10.86	$36.21	$53.86	$150.79
Secondary Regional Level Impacts	$0.00	$1.75	$3.87	$12.89	$19.17	$53.68
Webb						
Direct	$0.00	$0.00	$0.00	$0.00	$1.97	$4.44
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.70	$1.58
Total	$0.00	$6.67	$14.73	$49.09	$75.70	$219.23
Lost Income ($millions)						
Cameron	2010	2020	2030	2040	2050	2060
Direct	$0.00	$0.00	$0.00	$0.00	$0.00	$4.07
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$1.36
Hidalgo						
Direct	$0.00	$3.52	$7.77	$25.89	$38.52	$107.83
Secondary Regional Level Impacts	$0.00	$0.97	$2.14	$7.12	$10.60	$29.67
Webb						
Direct	$0.00	$0.00	$0.00	$0.00	$1.41	$3.18
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.39	$0.87
Total	$0.00	$4.48	$9.90	$33.01	$50.91	$146.98
Lost Jobs (numbers may not sum to figures in text due to rounding)						
Cameron	2010	2020	2030	2040	2050	2060
Direct	0	0	0	0	0	12
Secondary Regional Level Impacts	0	0	0	0	0	37
Hidalgo						
Direct	0	9	20	67	99	277
Secondary Regional Level Impacts	0	28	63	209	310	869
Webb						
Direct	0	0	0	0	4	8
Secondary Regional Level Impacts	0	0	0	0	11	26
Total	0	37	83	275	424	1,228

Lost Business Taxes ($millions)						
Cameron	2010	2020	2030	2040	2050	2060
Direct	$0.00	$0.00	$0.00	$0.00	$0.00	$0.65
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18
Hidalgo						
Direct	$0.00	$0.63	$1.39	$4.64	$6.90	$19.31
Secondary Regional Level Impacts	$0.00	$0.17	$0.38	$1.28	$1.90	$5.31
Webb						
Direct	$0.00	$0.00	$0.00	$0.00	$0.25	$0.57
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.07	$0.16
Total	$0.00	$0.80	$1.77	$5.91	$9.12	$26.18
Source: Texas Water Development Board, Office of Water Resources Planning						

Attachment C: Allocation of Economic Impacts by River Basin

Tables C-1 through C-4 distribute regional economic and social impacts by major river basin. Impacts were allocated based on distribution of water shortages among counties. For instance, if 50 percent of water shortages in River Basin A and 50 percent occur in River Basin then impacts were split equally among the two basins.

Irrigation

Table C-1: Distribution of Impacts among Major River Basins (Irrigation)

Lost Sales ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$112.08	$78.69	$49.47	$54.54	$56.82	$58.75
Rio Grande	$43.19	$41.57	$67.12	$68.10	$65.82	$63.89
Total	$155.27	$120.26	$116.59	$122.64	$122.64	$122.64
Lost Income ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$43.68	$30.69	$19.29	$21.27	$22.16	$22.91
Rio Grande	$16.83	$16.21	$26.16	$26.56	$25.67	$24.92
Total	$60.51	$46.90	$45.45	$47.83	$47.83	$47.83
Job Losses (numbers may not sum to figures in text due to rounding)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	2,082	1,461	919	1,013	1,055	1,091
Rio Grande	802	772	1,246	1,264	1,222	1,186
Total	2,884	2,233	2,165	2,277	2,277	2,277
Lost Business Taxes ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$2.19	$1.55	$0.96	$1.07	$1.11	$1.15
Rio Grande	$0.84	$0.82	$1.31	$1.34	$1.29	$1.25
Total	$3.03	$2.37	$2.27	$2.41	$2.41	$2.41

Source: Texas Water Development Board, Office of Water Resources Planning

Livestock

Table C-2: Distribution of Impacts among Major River Basins (Livestock)						
($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces	$0.67	$0.67	$0.67	$0.67	$0.67	$0.67
Nueces-Rio Grande	$1.04	$1.04	$1.04	$1.04	$1.04	$1.04
total	$1.71	$1.71	$1.71	$1.71	$1.71	$1.71
Source: Texas Water Development Board, Office of Water Resources Planning						

Manufacturing

All manufacturing impacts are in the Nueces-Rio Grande River Basin.

Mining

All mining impacts are in the Nueces-Rio Grande River Basin.

Municipal

Table C-3 Distribution of Impacts among Major River Basins (Municipal)						
Lost Sales ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$13.73	$43.84	$102.77	$166.52	$273.60	$435.77
Nueces	$0.03	$0.06	$0.10	$0.15	$0.23	$0.36
Rio Grande	$16.06	$44.73	$83.05	$125.56	$195.95	$302.55
Total	$29.81	$88.63	$185.93	$292.23	$469.79	$738.68
Lost Income ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$32.07	$89.34	$192.34	$307.20	$488.77	$743.72
Nueces	$0.06	$0.12	$0.19	$0.28	$0.42	$0.62
Rio Grande	$37.51	$91.15	$155.44	$231.64	$350.05	$516.35
Total	$69.64	$180.61	$347.97	$539.12	$839.23	$1,260.69
Job Losses (numbers may not sum to figures in text due to rounding)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	67	219	688	1,319	2,816	5,446
Nueces	0	0	1	1	2	5
Rio Grande	79	223	556	995	2,017	3,781
Total	146	442	1,245	2,315	4,836	9,232
Lost Business Taxes ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$0.19	$0.62	$1.73	$3.05	$6.07	$11.29
Nueces	$0.00	$0.00	$0.00	$0.00	$0.01	$0.01
Rio Grande	$0.22	$0.63	$1.40	$2.30	$4.35	$7.84
Total	$0.41	$1.24	$3.14	$5.36	$10.43	$19.13
Source: Texas Water Development Board, Office of Water Resources Planning						

Steam-electric

Table C-4: Distribution of Impacts among Major River Basins (Steam-electric)						
Lost Sales ($millions)						
Sales	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$0.00	$6.67	$14.73	$49.09	$73.75	$210.46
Rio Grande	$0.00	$0.00	$0.00	$0.00	$1.96	$8.77
Total	$0.00	$6.67	$14.73	$49.09	$75.70	$219.23
Lost Income ($millions)						
Sales	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$0.00	$4.48	$9.90	$33.01	$49.59	$141.11
Rio Grande	$0.00	$0.00	$0.00	$0.00	$1.32	$5.88
Total	$0.00	$4.48	$9.90	$33.01	$50.91	$146.98
Job Losses (numbers may not sum to figures in text due to rounding)						
Sales	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	0	37	83	275	413	1,179
Rio Grande	0	0	0	0	11	49
Total	0	37	83	275	424	1,228
Lost Business Taxes ($millions)						
Sales	2010	2020	2030	2040	2050	2060
Nueces-Rio Grande	$0.00	$0.80	$1.77	$5.91	$8.88	$25.14
Rio Grande	$0.00	$0.00	$0.00	$0.00	$0.24	$1.05
Total	$0.00	$0.80	$1.77	$5.91	$9.12	$26.18
Source: Texas Water Development Board, Office of Water Resources Planning						

APPENDIX D

TECHNICAL MEMORANDUMS

Potential Water Savings in Irrigated Agriculture for the Rio Grande Planning Region (Region M)
2005 Update

Estimating the Required Investment to Attain Region M Water Savings Through Rehabilitation of Water-Delivery Infrastructure – 2005 Perspectives

Water Management Strategies Cost Analysis

Socioeconomic Impacts of Unmet Water Needs in the Rio Grande Water Planning Area

Potential Water Savings in Irrigated Agriculture for the Rio Grande Planning Region (Region M)

2005 Update

May 6, 2005

by

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SUMMARY

This report updates the information provided to the Region M Planning Group in December 2000 and details the potential water savings in irrigated agriculture which are shown below. County estimates are also included in this report.

WATER SAVING POTENTIAL IN IRRIGATION DISTRICTS AND ON-FARM IN ACRE-FEET PER YEAR

Water Supply Condition	District Conveyance Efficiency Improvement	On-farm Practices and Methods	
		With district improvements	Without district improvements
drought	154,393	172,612	96,296
normal	243,092	274,033	125,194

Conveyance Efficiency Improvements are water savings from the reduction of transportation, operation and accounting water losses in irrigation districts, and the increase of conveyance efficiencies from current average of 69.7 to 90%.

On-farm Practices and Methods are water savings from the expansion of water measurement/metering, replacement of field ditches with poly pipe, and adoption of improved water management practices and irrigation technologies

Other findings and conclusions are as follows.

Description of Districts

- The main distribution networks of irrigation districts consist of 795 miles of canals, 192 miles of pipeline, and 76 miles of resacas.
- The secondary and tertiary networks ("laterals") consist of about 673 miles of canals and 1755 miles of pipelines.
- There are a total of 699 miles of lined canals (lined with concrete of similar materials), 712 miles of unlined canals, and about 57 miles of canals which we do not know their lining status.
- The 9 largest districts (out of 28) hold 74% of all agricultural water rights.

Conveyance Efficiency

- Canals are in poor condition with an average condition rating of 6.4 (on a 10 point scale).

- Measured seepage loss rates in 10 lined canals (concrete or related lining type) ranged from 0.6 to 8.8 gal/ft^2/day. The smaller canals had the highest seepage loss rates. The annual projected water loss from these canal segments ranges from 61 to 494 ac-ft/mi/yr.

- High seepage losses in lined canals indicate that improper construction methods and materials are being used in the region, and that some districts have inadequate maintenance programs.

- When classified by soil type, seepage loss rates measured in 9 unlined canals were similar to those reported in the scientific literature, and ranged from 0.15 to 13.85 gal/ft^2/day. The annual projected water loss from these canal segments ranges from 23 to 1690 ac-ft/mi/yr.

- Total loss rate tests results in lined canals ranged from 0.6 to 164 gal/ft^2/day or annual projected losses of 45 to 1520 ac-ft/mi/yr. These total losses include seepage and leaks through gates and valves.

- Total loss rate tests results in unlined canals ranged from 0.6 to 8.5 gal/ft^2/day or annual projected losses of 45 to 1213 ac-ft/mi/yr.

- Total loss test results indicate that leaks though valves and gates is a significant loss of water.

- There are at least 219 miles of concrete pipelines with mortar joints. Inflexible pipeline joints are likely to have high leakage rates. We have no information on the type of joints in 1327 miles of concrete pipelines.

- Four spill loss and recovery sites previously monitored had spill rates ranging from 28 to 4684 ac-ft/yr. There are at least 64 major spill sites in the region.

On-farm

- At 50% of the area experiences frequent head problems, causing insufficient water volume at the field turn-out to allow for efficient furrow irrigation.

- Currently, 54% of the water delivered in the region is under consistent water measurement or metering programs by districts.

- On-farm, about 36% of the water applied in the region is through "poly" (or gated) pipe, and 30% is applied with high water management and/or improved irrigation technology.

General

- Questions have been raised on the accuracy of the information districts use to estimate conveyance efficiency (or "water duty") including metering at the river pumping plants.

- Uniform database formats and software are needed among districts to help promote district accounting system modernization and integration with GIS, as well as supporting water measurement and district rehabilitation programs.

- To achieve the projected water savings, a comprehensive and integrated program is needed that addresses all aspects of water supply and use in districts. The Imperial Irrigation District's program with the Municipal Water District is one model to use in designing a program for the Rio Grande Planning Region.

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ABOUT THIS REPORT

This report was completed for the Region M Water Planning group by the Irrigation Technology Center (ITC), Texas A&M University under the direction of Dr. Guy Fipps. Funding was provided through Texas Cooperative Extension under a contract with NRS Engineering, Inc.; dates of the contract are March 28, 2005 – May 31, 2005.

This report updates the information presented in the December 22, 2000 report: ***Potential Water Savings in Irrigated Agriculture for the Rio Grande Planning Region (Region M)*** (referenced here as REPORT 1). Complete text of REPORT 1 was included in the appendix of the Region M 2001 water planning report under *Technical Memorandums*; it is also posted at http://idea.tamu.edu under the "reports" section of the website.

No new information was collected for this report. Instead, we updated the data, conclusions and water savings estimates based on data that the ITC has collected over the last 5 years as a part of our Irrigation District Engineering and Assistance program. For more information, see our website: http://idea.tamu.edu. Only those tables in REPORT 1 that are relevant to the current water saving potential analysis have been updated and/or included in this report. The original table numbers from REPORT 1 are also included on each table.

LITERATURE REVIEW

Very little information has been reported in the scientific literature on canal seepage and reduction from district rehabilitation projects. What data is available was discussed in REPORT 1 and is summarized in Table 1.

For REPORT 1, we also investigated Imperial Irrigation District's (IID) program with the Municipal Water District (MWD). IID received $109 million to save 100,000 ac-ft/yr of water which was then leased to the MWD for a period of about 40 years. IID's program is summarized in Table 2. Key points relevant to Region M are:

- This is an integrated program that includes elements aimed at improving both the conveyance efficiency and on-farm irrigation.
- The program includes elements that are resulting in large water savings, as well as those needed to improve the overall operation of the district.
- About 16% of the total budget was spent on program verification which saves no water. However, program verification is important in order to develop confidence in achieved water savings among all parties, including the growers of the district. This program also produced the data needed in various lawsuits questioning the success of the program.

DESCRIPTION OF THE DISTRICTS

Water Rights

The names and authorized water rights of 28 water districts in Hidalgo, Cameron, Willacy and Maverick Counties are listed in Table 7. This information was obtained from the Rio Grande Watermaster office. Figure 1 shows the irrigation district boundaries in the LRGV, and Figure 4 shows Maverick ID.

These districts hold authorized agricultural water rights totaling 1,562,932 ac-ft, a decline of 40,282 ac-ft since 2000. Based on water rights, the districts vary greatly in size, with the smallest active district having 3,773 ac-ft and the largest district 174,776 ac-ft.

- The 5 largest districts (Mercedes, Delta Lake, San Benito, Maverick and San Juan) account for 49% of all agricultural water rights.
- The largest 9 districts (adding Harlingen, Donna, Edinburg, and Santa Cruz) account for 72% of the total.

Water Distribution Networks

The main irrigation distribution networks of the LRGV districts are shown in Figure 2. Figure 4 shows both the mains and laterals for Maverick ID. Figure 3 shows both the mains and laterals for the LRGV districts.

Distribution Networks of Districts (miles)

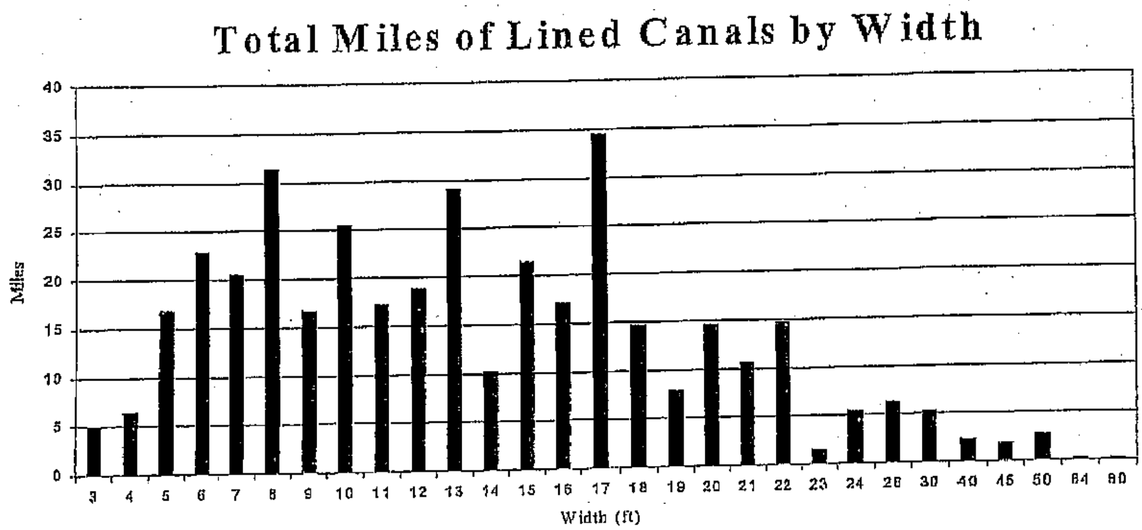
	Canals				Pipeline	Resaca
	Lined	Unlined	Unknown	Total		
Mains	329	466	0	795	192	76
Laterals	370	246	57	673	1755	
Totals	699	712	57	1467	1947	76

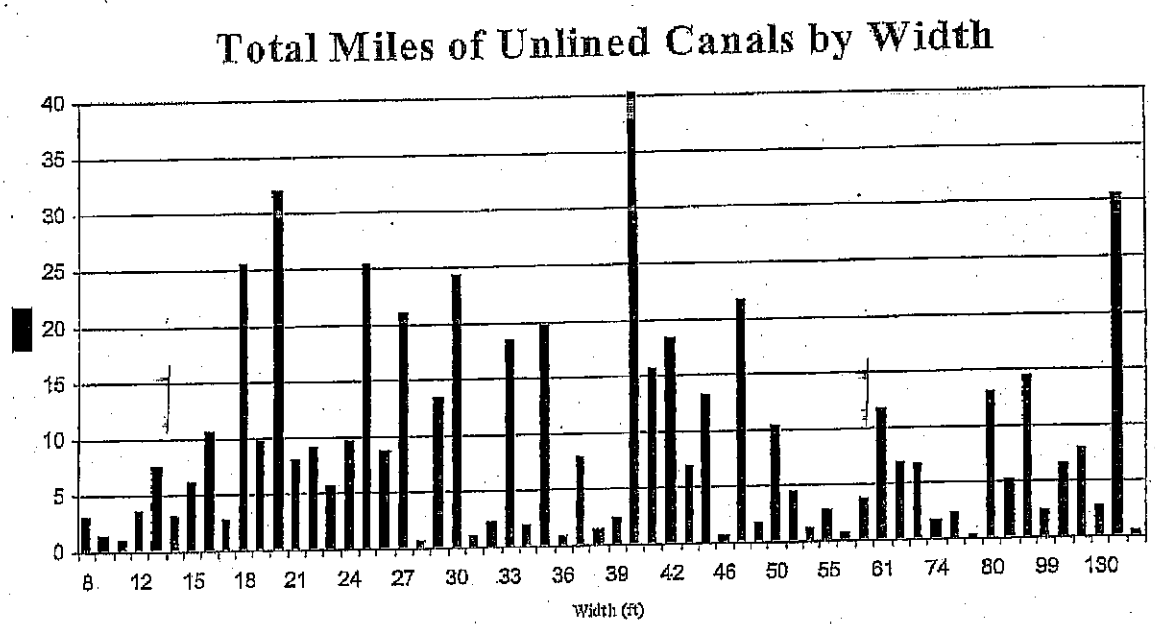
The total extent of the distribution networks is shown on the left. We have obtained information on the lining status of all but 57 miles of canals (Table 4).

"Laterals" refers to the secondary and tertiary networks of districts, which carry water from the mains to the field turnouts.

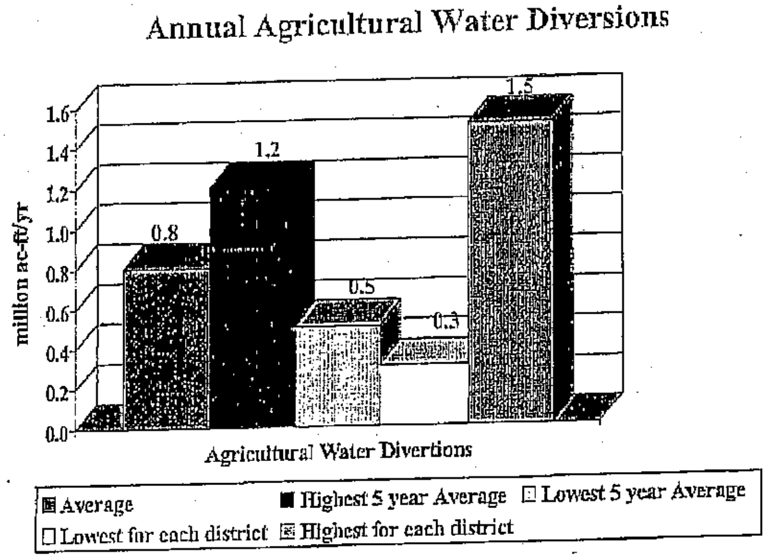
"Resaca" refers to ox bow lakes common in the LRGV. These are used by districts as water storage and transportation channels.

The lengths of lined and unlined canals by top width are shown in the two charts below. See Table 6 for information on the storage reservoirs and capacity. Additional details on the water distribution networks are provided in Tables 3 and 4. County breakdowns of canal lengths by known widths and lining status are given in Table 5.



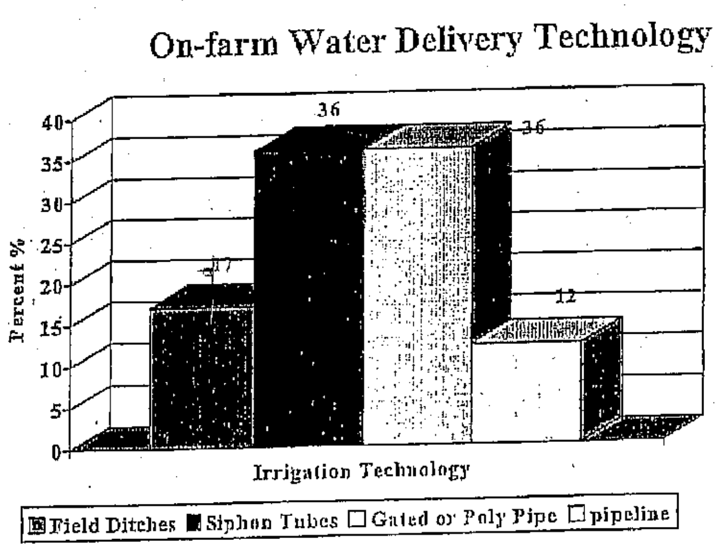


Diversions



As shown above, agricultural water diversions vary greatly from year to year depending on water supply, weather, and crop economics. Diversions for the period 1986-2004 as obtained from the Rio Grande Watermaster Office are given in Tables 8 and 9.

ON-FARM WATER DELIVERY TECHNOLOGY



This chart shows the current use of on-farm water supply methods.

Poly pipe generally has the least water loss and can promote good surface irrigation efficiency.

Cutting of field ditches and siphon tubes generally provide insufficient control over water flow for good surface irrigation efficiency.

WATER MEASUREMENT PROGRAMS

We estimate that about 57% of on-farm water deliveries are directly measured or metered by districts. The most effective programs are those that provide incentives through water pricing or credit programs, and in which district personnel provide technical assistance to growers on improved irrigation water management. For example, Brownsville uses a combination of incentives, tailwater fines and technical assistance. The district moved valves to the center of fields at no cost to the grower to facilitate the use of poly pipe and surge flow valves. Similarly, Bayview provided poly pipe to growers at low cost when first implementing a water metering program.

District Databases

However, water measurement programs require additional manpower for collecting and recording the data. Districts without modern databases and water accounting systems have had difficulty in managing the large amounts of information being collected.

Most districts have custom (i.e., non-commercial) databases which district personnel do not know how to modify. Thus, the database programmer must be contracted to make changes which are needed for water accounting and for integration with GIS-based management systems. Uniform database formats and software among districts would help promote district accounting system modernization.

CONVEYANCE EFFICIENCY

We estimate the current average conveyance efficiency of districts as 69.7. The term conveyance efficiency (or water duty) is a measurement of all the losses in an irrigation distribution system from the river (or diversion point) to the field. Conveyance efficiency is calculated from the total amount of water diverted in order to supply a specific amount of water to a field (6 inches for most districts that do not meter or measure).

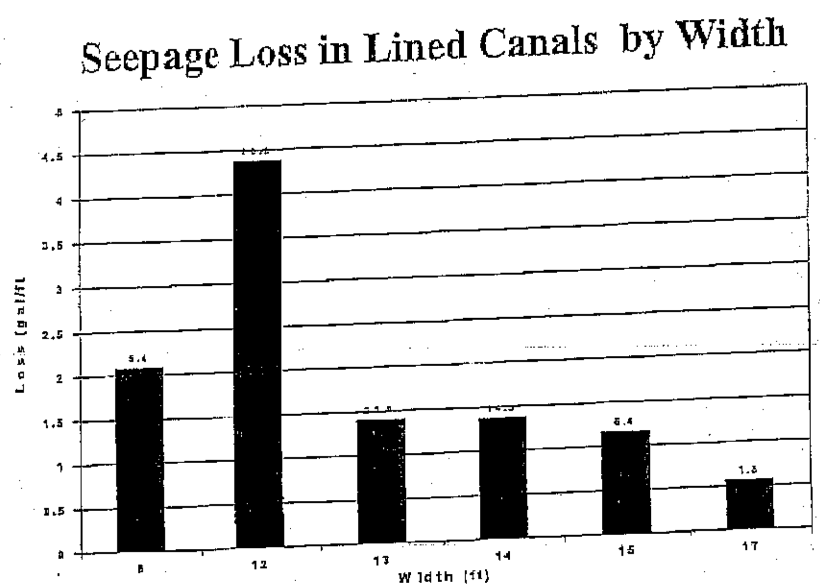
Districts express conveyance efficiency in terms of efficiency, the percent of water lost, or amount of water pumped (in feet). For example, District A must pump 8 inches from the river in order to deliver 6 inches to the field. District A's losses can be expressed as a:

- conveyance efficiency of 75%,
- water duty of 25%, or
- water duty of 0.67 ft.

Conveyance loss includes other factors in addition to seepage and evaporation. Table 10 shows the various components of conveyance efficiency under the three major categories of Transportation, Accounting, and Operational losses. County estimates of district conveyance efficiencies are given in Table 15.

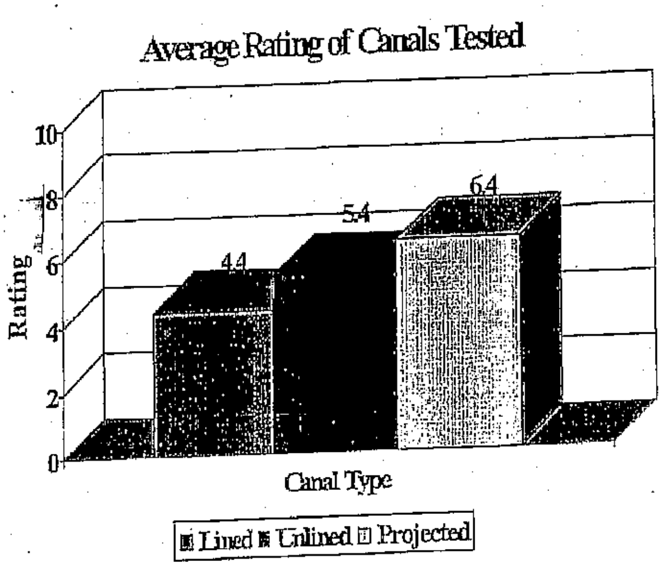
Lined Canals

The term "lined canals" refers to canals lined with concrete of similar material. Since 1997, we have conducted seepage and total loss tests in 34 lined canals using the ponding test method. The results are shown below and in Table 11. Note that total loss tests include canal seepage and evaporation, as well as water that may have leaked undetected through gates and valves.



The chart on the left shows the measured seepage loss rates in concrete canals for representative widths.

The highest loss rates occurred in canals less than 12 feet in width.



We rates most of the canals tested on a scale from 1 (poor) to 10 (excellent).

The results are shown on the left. Overall, lined and unlined canals which were tested are in poor condition with an average condition rating of 4.4 and 5.4, respectively.

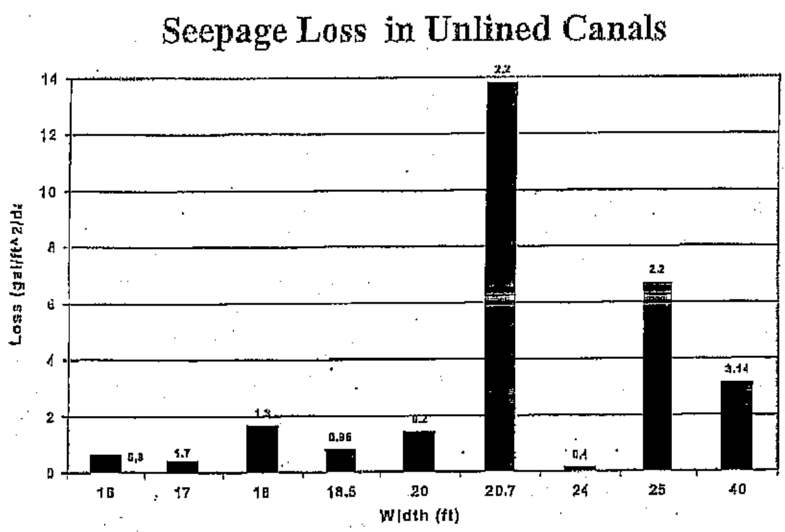
We estimate that the average rating of all lined canals in Region M is 6.4.

The poor condition of the lined canals indicate problems with materials and construction methods. Most canals are lined with unreinforced concrete, which are susceptible to cracking due to shrinking and swelling soils. For larger canals, consideration should be given to composite construction with reinforced concrete and membranes.

Lining and pipeline replacement of canals to reduce seepage is not the only consideration. Leaking gates and valves can also be a major source of water loss and should be considered as part of any rehabilitation program.

Unlined Canals

We have conducted 9 seepage loss tests in 9 and 11 total loss tests in unlined canals (Table 11b). These loss rates were similar to those reported in the scientific literature based on soil type (Table 1).



For the LRGV (not including Maverick Irrigation District), the extent of unlined canals that are located in loamy to sandy soils is given below, along with the total canal surface area for lining. This information was not completed for Maverick ID since a GIS-based soil series map for the county was not available.

Unlined Canals in Sandy and Loamy Soils*

Width (ft)	Extent (miles)	Area (million ft^2)
0-39	48	9.4
40-69	39	13.5
>70	31	17.9

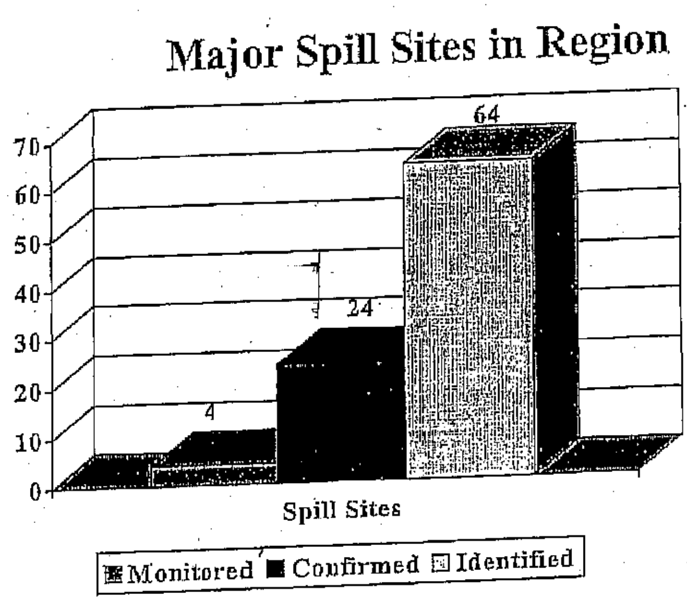
* includes all mains and 64 % of laterals for LRGV.

In a rehabilitation program, unlined canals in lighter, more permeable soils should be investigated for possible lining or replacement with pipelines, particularly canals that are less than 40 feet in width.

Spills

Four (4) spill loss and recovery sites were documented previously. Two of the sites allowed excess canal water to flow into pipes. The third was a drop inlet in a reservoir to control water levels, and the fourth is a pump-back system to return water from a reservoir to a canal.

The spill loss rates for the first 3 sites ranged from 28 to 1118 ac-ft/yr for the period 1999-2000 (Table 12). The one spill recovery site monitored saved 4684 ac-ft/yr that otherwise would have been lost without this facility. We conclude that spills are a major source of water losses in the region. We have independently verified 24 major spill sites in the region out of a total of 64 identified in surveys.



Spill loss reduction involves rehabilitation of distribution networks such as increasing the capacity of segments and the construction of storage, interception and recycling facilities.

It also involves better management of the system through automatic gate control and training of canal riders and other district personnel on distribution system management.

POTENTIAL WATER SAVINGS

Table 14 summarize the procedures and assumptions used in calculating the on-farm potential water savings shown below. Individual county estimates of water saving potential are provided in Tables 16 and 17. For these estimates, drought conditions are based on the year 2010 water supply scenario of 0.8 million ac-ft developed by R.J. Brandes for this project. Normal conditions are based on the average diversions for the highest 5 years during the period 1986 - 2004 (Table 9).

WATER SAVING POTENTIAL IN IRRIGATION DISTRICTS AND ON-FARM (acre-feet per year)

Water Supply Condition	District Conveyance Efficiency Improvement	On-farm Practices and Methods	
		With district improvements	Without district improvements
drought	159,631	174, 537	105,029
normal	210,944	226,178	142,852

The water savings listed under *District Conveyance Efficiency Improvement* (above) are based on increasing current efficiencies to 90%. Individual county estimates of current efficiencies and water saving potential are provided in Table 16 for Cameron, Willacy, Hidalgo and Maverick, the four counties containing irrigation districts.

The water savings listed under *On-farm Practices and Methods* (above) would result from the expansion over current levels of practices and technology related to:

- implementation of water measurement or metering programs
- replacement of field ditches and siphon tubes with poly pipe or gated pipe
- adoption of improved water management practices and technologies

Achievable on-farm water savings are listed for each county in Tables 16 and 17. No significant on-farm water savings are expected in Web, Zapata and Jim Hogg Counties.

Water savings are given for two cases: with and without improvements in district conveyance efficiency. Conveyance efficiency determines how much water reaches the field turnout. Its improvement will also help eliminate the "head" problems experienced in the region and enable the use of improved water management practices and technologies.

Uncertainties in Estimate

There is uncertainty about the accuracy of the basic information that districts use to estimate conveyance efficiency, particularly:

- the amount of water pumped or diverted into the system, and
- the actual amount of water delivered to the field.

The doppler flow meters currently used at many river pumping plants were calibrated for each site based on estimates of pumping rate, pumping plant capacity, or engine/motor and pump performance. Due to the physical layout of the pumping plants, it is difficult to independently verify these rates. Historically, little water measurement was done at the field turn-out, and the amount delivered is also an estimate in many districts. Some districts have antiquated database and accounting systems, making it difficult to extract water use records for analysis.

ABBREVIATIONS

ID	Irrigation District
ITC	Irrigation Technology Center (for more information, see http://itc.tamu.edu)
GIS	Geographical Information System
LRGV	Lower Rio Grande Valley of Texas, includes the counties of Cameron, Hidalgo, Willacy and Starr
Phase II	Integrated Water Resources Planning - Phase II Project, involving Cameron, Hidalgo, and Willacy Counties.
Region M	Rio Grande Planning Region, defined by the Texas Water Development Board as: Cameron, Hidalgo, Willacy, Starr, Maverick, Web, Zapata, and Jim Hogg Counties
REPORT 1	The report: *Potential Water Savings in Irrigated Agriculture for the Rio Grande Planning Region (Region M),* December 22, 2000 by Guy Fipps (see http://idea.tamu.edu for a downloadable copy)

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Table 1a (I-1). Canal seepage rates reported in published studies.

Lining/soil type	Seepage rate (gal/ft^2/day)
Unlined[1]	2.21-26.4
Portland cement[2]	0.52
Compacted earth[2]	0.52
Brick masonry lined[3]	2.23
Earthen unlined[3]	11.34
Concrete[4]	0.74 – 4.0
Plastic[4]	0.08 – 3.74
Concrete[4]	0.06 – 3.22
Gunite[4]	0.06 – 0.94
.Compacted earth[4]	0.07 – 0.6
Clay[4]	0.37 – 2.99
Loam[4]	4.49 – 7.48
Sand[4]	4.0 – 19.45

[1] DeMaggio (1990).
[2] U.S. Bureau of Reclamation (1963).
[3] Nayak, et al. (1996).
[4] Nofziger (1979).

Table 1b (I-2). Seepage losses on two canal reaches before and after lining in Boise, Idaho with asphaltic prefabricated liners with fiber reinforcement

	Unimproved (gal/ft^2/d)	**Improved (gal/ft^2/day)**
Reach 1	20.42	0.22
Reach 2	4.03	0.15

Source: U.S. Bureau of Reclamation (1963).

Table 1c (I-4). Canal seepage rates reported for the Lower Rio Grande Valley.	
Soil Type	**Seepage Loss Rate ($gal/ft^2/day$)**
clay	1.5
silty clay loam	2.24
clay loam	2.99
silt loam earth	4.49
loam	7.48
fine sandy loam	9.35
Sandy loam	11.22

Source: Texas Board of Water Engineers (1946).

Table 1d (I-5). Results of the Bureau of Reclamation's canal lining demonstration program. All canal segments are in a volcanic soil with gravel and sand.

Liner Type	Pre-lining Seepage Loss ($gal/ft^2/day$)	Post Construction Seepage Losses($gal/ft^2/day$)			Construction Cost ($\$/ft^2$)
		after 1 year	after 5 years	after 6 years	
Geomembrane with shotcrete cover	10.47	.37 - .82	0 - 2.24		\$2.43 - \$2.52
Exposed Geomembrane	10.47	0 - .90	0 - 3.74	0.299	\$1.03 - \$1.38
Geomembrane with grout mattress cover	4.79	0.75	0 - 2.99	0.37	\$2.54
Grout mattress	4.79	0.15	2.24 - 3.74	2.17	\$1.79 - \$1.92
Roller Compacted Concrete Invert Only	23.18 - 40.39	18.92			\$2.64 - \$4.33
Shotcrete		3.29 (@ 2 yrs)		2.99	\$2.14 - \$2.43

Table 2a (I-6). Elements of Imperial Irrigation District's water conservation program with the Municipal Water District.				
Water Conservation Practice	Capital Costs (1999$)	O&M Costs[2] for 1999	Water Conserved	
			Ac-Ft	$/ac-ft (1988$)
Spill Recovery (3 sites)	28,782,805	1,019,340	32,060	84
Canal Lining (210 miles)	46,023,975	1500	25,550	132
Water Measurement	0	1,525,207	21,750	57
Non-leak Gates (15 out of 127)	212,595	10,421	630	37
On-farm Evaluations and Demonstrations	0	297,565	280	787
System Automation	12,918,625	1,202,090	14,600	124
Tailwater Return Systems (25, 6,779 ac)	3,502,320	335,627	4540	111
Program Verification[1]	17,432,682	854,324		
Total	108,873,002	5,246,074	99,410	127

[1] costs of the verification program are included in the Total Program costs of $127/ac-ft
[2] O&M costs vary from year to year

Table 2b (I-7). Costs and benefits of the main elements of Imperial Irrigation District's water conservation program.			
Water Conservation Practice	Capital Costs (% of total)	O&M Costs for 1999 (% of total)	Water Conserved (% of total)
Spill Recovery	26	19	33
Canal Lining	42	0.03	26
Non-leak Gates	0.2	0.2	0.6
System Automation	12	23	15
On-farm	3.2	41	27
Program Verification	16	17	0

Table 3a. (III-1). Total extent of the main irrigation water distribution networks ("mains").			
	Main Irrigation Distribution Network (miles)		
District	Canals	Pipeline	Resacas
Adams Garden	21.49	2.01	2
Bayview	14.06	0.43	12
Brownsville	2.36	31.08	25
San Benito	108.52	0.74	14
Los Fresnos	41.82	0.0	11
Rutherford-Harding	4.67	1.84	8
Cameron #16	3.61	0.0	4
Delta Lake	69.43	7.71	0
Donna	32.49	0.8	0
Engleman Gardens	12.43	5.7	0
Mercedes	71.8	2.74	0
Harlingen	52.78	7.65	0
Edinburg	35.54	24.37	0
McAllen #3	9.7	3.67	0
Baptist Seminary	0.0	4.61	0
HCID #14	0.0	0.0	0
Mission #16	15.17	2.25	0
Monte Grande	0.0	0.0	0
San Juan	37.5	50.48	0
Progreso	0.8	20.54	0
Mission #6	19.42	0.0	0
Sharyland Plantation	4.58	0.0	0
La Feria	43.74	4.02	0
Maverick	120.86	0.0	0
Santa Cruz	34.06	4.58	0
Santa Maria	2.92	0.0	0
United	29.11	5.9	0
Valley Acres	5.66	10.29	0
Total	794.56	192	76

Table 3b (III-2). Total extent of the secondary irrigation water distributions networks (laterals) and percent that has been mapped

District	Canals		Pipeline	
	Total miles	% mapped	Total miles	% mapped
Adams Garden	2.1	100	54.22	95
Bayview	3.52	100	27.99	100
Brownsville	0.0		95.23	100
San Benito	97.42	100	54.71	100
Los Fresnos	81.33	100	39.31	100
Rutherford-Harding	.72	100	.99	55
Cameron #16	0.0		0.0	
Delta Lake	118.04	100	183.94	100
Donna	69.3	100	92.2	100
Engleman Gardens	.52	100	39.01	100
Mercedes	3.16	100	250.53	100
Harlingen	1.38	100	159.5	98
Edinburg	33.05	100	83.06	90
McAllen #3	0.0		0.0	
Baptist Seminary	0.0		0.0	
HCID #14	0.0		0.0	0
Mission #16	6.55	100	34.37	100
Monte Grande	0.0	0	0.0	0
San Juan	35.17	100	177.18	100
Progreso	0.0		11.63	95
Mission #6	43.4	100	58.49	95
Sharyland Plantation	1.14		0	
La Feria	2.09	100	113.76	90
Maverick	142.7	95	0.0	0
Santa Cruz	2.81	100	145.06	95
Santa Maria	0.0		10.46	95
United	27.68	100	107.66	100
Valley Acres	0.0		15.14	100
Total	672.72	98	1754.63	95

Table 3c (III-3). Miles of pipelines for 25 irrigation districts in the Rio Grande Planning Region classified by known and unknown diameters.

District	Known Diameters (mi)	Unknown Diameters (mi)
Adams Gardens	0.0	56.23
Bayview	0.0	28.42
Brownsville	126.31	0.0
San Benito	37.99	17.46
Rutherford-Harding	1.08	1.75
Delta Lake	117.1	74.5
Engleman Gardens	.11	44.6
Mercedes	0	253.27
Edinburg	47.57	59.86
Baptist Seminary	3.8	.85
San Juan	225.23	2.43
Progreso	8.81	23.36
Mission #16	0	36.62
McAllen #3	3.67	0
Sharyland Plantation	0	0
Harlingen	0	167.2
La Feria	0	117.78
Maverick	0	0
Santa Cruz	6.25	143.39
Santa Maria	10.46	0
United	0	113.56
Valley Acres	24.72	.71
Los Fresnos	0	39.31
Donna	0	93.07
Mission #6	0	58.49
Total	**613.1**	**1333.07**

Table 4a (III-4). Extent of canals by canal top width and lining status in the Rio Grande Planning Region.

Lined		Unlined	
Top Width (ft)	Extent (mi)	Top Width (ft)	Extent (mi)
unknown	313.37	unknown	87.12
<= 4	9.42	<=10	5.44
4 - 6	38.73	10 - 18	59.38
6 - 7	19.21	18 - 20	41.90
7 - 8	32.40	20 - 25	57.94
8 - 9	17.07	25 - 27	29.76
9 - 10	26.1	28 - 30	38.40
10 - 11	12.34	30 - 35	43.17
11 - 12	19.59	35 - 39	12.72
12 - 13	29.97	40	122.26
13 - 14	13.15	40 - 45	54.15
14 - 15	21.94	45 - 50	34.29
15 - 16	18.01	50 - 60	12.83
16 - 17	26.22	60 - 80	29.47
17 - 18	23.55	80 - 100	41.40
18 - 20	22.41	117	7.95
20 - 21	10.63	139 - 150	33.85
21 - 24	16.71		
24 - 30	11.34		
30 - 40	1.74		
50 - 80	3.92		
Total	687.82	Total	712.03
Gunite		Unknown lining status	
unknown	0.77	unknown	56.64
6-12	2.86		
22	5.04		
45	1.96		
Total	10.63		

Table 4b (III-5). Irrigation district pipelines listed by pipe diameter and type (miles)

Diameter (in)	Total	Flexible Joints				Mortar Joint	Unknown Joints			
		PVC	Reinforced Concrete	Concrete	Rubber Gasket	Concrete	Concrete	Steel	PVC	Unknown
2	0.44						.44			
3	0.17								.17	
8	1.38						.15		1.23	
10	1.47						1.01		.46	
12	30.07	2.31	0.47	1.96		2.25	22.71	0.01	.99	
12.5	0.02						.02			
13	0.07						.07			
14	34.35		0.02	1.79		15.70	16.84			
15	77.48	4.54	5.72	0.25		1.14	52.82		13.01	
16	53.99		1.15	1.03		37.33	13.57	0.02		0.89
18	105.25	4.19	6.65	6.04		29.86	52.72		5.79	
20	9.93			0.95		0.74	8.24			
21	34.95	2.06	3.13	1.16		.92	26.54		1.14	
24	117.03	3.11	17.52	11.63		31.59	51.92	0.04	1.22	
25	8.79						8.79			
27	1.84			0.49					1.35	
29	0.56						0.56			
30	56.88		11.92	3.93		9.71	31.29	0.03		
36	25.96		9.86	4.13		6.71	5.26			
40	0.25						0.25			
42	12.16		4.84	1.44		4.70	1.18			
48	18.68		7.07	4.03		6.36	1.22			
52	1.20						1.2			
54	8.62		3.13	1.23		1.0	3.26			
60	4.74		0.99	1.63		2.12				
72	6.19			4.44			1.73	0.02		
Unknown	1333.07	3.53	3.14	110.91	4.13	69.78	1024.9	0.47	15.25	100.96
Total	1946.57	19.74	75.61	157.04	4.13	219.91	1326.69	0.59	40.61	101.85

Table 5a (III-6). Miles of lined canals by county and canal top width.

Top Width (ft)	Maverick	Hidalgo	Cameron	Willacy	Total
<= 10	35.63	47.71	12.98	46.54	142.86
10-15	0.0	64.05	24.72	10.88	99.65
15-20	0.0	76.93	13.30	0.0	90.23
20-30	0.0	34.42	4.24	0.0	38.66
30-50	0.0	4.78	0.2	0.0	4.98
50-80	0.0	1.67	0.0	0.0	1.67
Total	35.63	229.56	55.44	57.42	378.05

Table 5b (III-7). Miles of unlined canals by county and top width.

Top Width (ft)	Maverick	Hidalgo	Cameron	Willacy	Total
≤20	48.01	22.01	36.62	0.0	106.64
20-30	26.39	18.34	81.28	0.0	126.01
30-45	70.44	17.80	143.06	0.0	231.3
45-80	3.55	13.94	53.13	5.93	76.55
≥90-150	20.85	45.36	17.01	0.0	83.22
Total	169.33	117.45	331.1	5.93	623.81

Table III-12. Known storage capacity of districts.

District	Storage Reservoir Near Main Pumping Plant	Surface Area (ac)	Storage Volume (ac-ft)	Storage Reservoirs Within District	Surface Area (ac-ft)	Storage Volume (ac-ft)	Resacas	Surface Area (ac-ft)	Storage Volume (ac-ft)
Bayview							27		2,000
Brownsville							6	531	2,100
San Benito	1	530	1,590				2	320	1,600
Los Fresnos							2	1,130	5,000
Cameron #16	1	165	159						
Delta Lake				1	2,400	12,000			
Donna				1	360	1,800			
Engelman Gardens	1	60	6,069	1	40	250			
Mercedes	1	750	5,000	3	30	200			
Harlingen	1	160	500	2	110	440			
Edinburg				1	84	500			
Baptist Seminary				2	2	9			
San Juan	1	350	1,700						
Mission 6	2	175	900						
Monte Grande									
McAllen #3				1	47	600			
Progreso	1	48	384	1	50	400			
La Feria				1	260	18,000			
Santa Cruz				4	828	4,225			
United									
Valley Acres	1	325	1,625						
Adams Garden	2	470	1,950						
Rutherford-Harding	1		700						
Santa Maria									
Mission #16	1	500	2,500						
Maverick				1	35	200			

Table 7 (V-1). The official and common names of 28 irrigation and water supply districts in the Rio Grande Planning Region and their authorized agricultural water rights.

Official Name	Common Name	Water Right (ac-ft)
Adams Gardens Irrigation District No. 19	Adams Garden	18,737
Bayview Irrigation District No. 11	Bayview	17,478
Brownsville Irrigation District	Brownsville	33,949
Cameron County Irrigation District No. 3	La Feria	75,626
Cameron County Irrigation District No. 4	Santa Maria	10,182
Cameron County Irrigation District No. 6	Los Fresnos	52,142
Cameron County Water Improvement District No. 10	Rutherford-Harding	8,588
Cameron County Water Improvement District No. 16	Cameron #16	3,773
Cameron County Irrigation District No. 2	San Benito	147,823
Delta Lake Irrigation District	Delta Lake	174,776
Donna Irrigation District Hidalgo County No. 1	Donna	94,063
Engleman Irrigation District	Engleman	18,994
Harlingen Irrigation District No. 1	Harlingen	98,232
Hidalgo and Cameron Counties Irrigation District No. 9	Mercedes	177,152
Hidalgo County Improvement District No. 19	Sharyland Plantation	9,438
Hidalgo County Irrigation District No. 1	Edinburg	85,615
Hidalgo County Irrigation District No. 2	San Juan	137,675
Hidalgo County Water Irrigation District No. 3	McAllen #3	9,752
Hidalgo County Irrigation District No. 5	Progreso	14,234
Hidalgo County Irrigation District No. 6	Mission #6	34,913
Hidalgo County Irrigation District No. 16	Mission # 16	30,749
Hidalgo County Irrigation District No. 13	Baptist Seminary	4,857
Hidalgo County Water Control and Irrigation District No. 18	Monte Grande	5,505
Hidalgo County Municipal Utility District No. 1	MUD	6,011
Santa Cruz Irrigation District No. 15	Santa Cruz	77,180
United Irrigation District of Hidalgo County	United	64,464
Valley Acres Water District	Valley Acres	16,124
Maverick County Water Control and Improvement District	Maverick	134,900
	Total	1,562,932

Table 8a (IV-2). Annual agricultural water diversions (ac/ft/yr) as obtained from the Rio Grande Watermaster Office.

District	1986	1987	1988	1989
Adams Garden	12569	7987	12440	17605
Bayview	7353	4439	8294	8360
Brownsville	11198	9132	14351	21288
San Benito	72398	45343	72638	100138
Los Fresnos	4896	22958	31630	41313
Cameron #16	3285	1297	2677	3518
Delta Lake	87315	70631	71856	159024
Donna	49290	52545	67232	89214
Engelman Gardens	4714	3792	7253	13023
Harlingen	42199	26649	44638	58554
Edinburg	42068	49035	46226	92462
San Juan	79231	68976	90586	134174
McAllen #3	4811	3130	6095	8012
Progreso	10720	10315	13523	16809
Mission #6	20686	19271	26549	30599
United	52659	35560	40191	55037
Mercedes	102607	95083	135484	166103
Baptist Seminary	1087	1591	3043	1049
Mission #16	12168	13075	19300	25381
Monte Grande	2169	571	2216	2072
Sharyland Plantation	9594	10054	13300	15794
La Feria	48584	41730	52372	84605
Santa Cruz	44591	32718	49049	57686
Santa Maria	4984	6049	7304	9972
Russell Plantation	7274	6933	7102	8421
Maverick	51791	77168	131719	144976
Valley Acres				
MUD				
Total	**790241**	**716031**	**977065**	**1365188**

Table 8b (IV-2). Annual agricultural water diversions (ac-ft/yr) by districts as obtained from the Rio Grande Watermaster Office.

District	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Adams Garden	14907	10753	5177	9469	12183	9147	13223	9081	8843	5741	10060	7577	5995	4647	5774
Bayview	6357	9130	6272	9662	10835	13668	10648	6201	8819	6531	7511	9826	4119	3571	3052
Brownsville	17571	19176	6070	19853	16616	21074	13987	6552	12118	19437	17668	11734	17710	5709	5502
San Benito	106476	93283	48465	73657	106461	101465	78140	73370	48328	62589	73551	60813	46638	41903	54414
Los Fresnos	54555	42312	17598	32780	46406	43610	27474	23415	22932	19766	32925	12871	13392	8702	11939
Cameron #16	3545	2697	1382	2129	2133	1956	2079	811	1796	1692	2847	2153	758	923	685
Delta Lake	126568	93465	58937	99924	94360	99716	113613	84074	94690	40151	80893	91188	66653	39718	59239
Donna	72542	67645	35906	59932	67822	52078	50836	29740	39659	42012	40010	43469	37283	30609	44699
Engelman	9293	8302	2941	4313	5895	7799	12442	9707	9292	6718	5217	7682	7211	4708	3741
Harlingen	64854	47449	16724	34047	48201	40921	53952	43454	57159	35178	51783	44469	27673	24923	26233
Edinburg	82906	83631	61346	101281	48027	43841	39697	9970	23186	23212	40702	54994	30203	15529	23872
San Juan	111914	96492	55067	90321	92948	79616	82157	52129	58799	56218	56218	57417	56606	59080	44235
McAllen #3	4900	4856	684	3791	6246	6739	4608	2829	3393	56218	7491	4526	4123	1531	5533
Progreso	10826	12942	8850	14912	11402	4743	5329	5611	7893	5236	7377	6077	5646	4184	11330
Mission #6	19250	15806	10133	12717	26744	15601	18599	11920	13604	13048	16582	14071	11258	9278	1024
United	30401	23354	20062	29647	25548	31233	36825	23299	27956	22845	23640	31658	31594	16709	11914
Mercedes	144119	121608	77987	155298	136974	123955	81921	49795	79859	84101	82564	84158	46703	54499	75759
Baptist Seminary	2842	976	669	1440	764	1371	1859	760	1198	1257	2662	1042	5024	391	304
Mission #16	9800	9275	9318	17385	25344	19724	19333	9398	12823	8104	12235	9559	7469	4773	9480
Monte Grande	5505	3397	998	3725	3096	2085	2942	745	639	2066	754	736	37	257	419
Sharyland Plantation	4820	11877	10555	13481	11394	4520	5903	5754	4707	135	218	275	301	244	188
La Feria	71131	57618	33663	55434	66344	42887	40316	25970	32184	34566	41362	27765	19536	22980	25043
Santa Cruz	40801	25215	18264	4383	45975	55908	44456	23728	33914	25691	32437	29406	22955	24183	25013
Santa Maria	10183	8019	3732	9827	9159	6323	2632	2604	3760	3975	6213	3892	2846	4129	4338
Maverick	77168	87585	87747	132196	105893	68231	73253	68231	42677	35094	55330	71694	45582	32872	32780
Valley Acres						11408	13502	8503	8384	9530	11880	9367	6509	4264	583
MUD						584	871	594	702	2302	2384	1092	636	510	1441
Total	**1103233**	**956852**	**598546**	**991606**	**1026770**	**910203**	**850597**	**588243**	**659317**	**623413**	**722514**	**699531**	**524460**	**420826**	**489534**

Table 9 (IV-3). Summary of the annual agricultural water diversions by districts (ac-ft). The lowest and highest annual divisions are for individual districts and did not necessarily occur in the same years.

District	Avg over all yrs	Avg for 5 high years	Avg for 5 low years	Lowest for each district	Highest for each district
Adams Garden	9694	14149	5667	4647	17605
Bayview	7613	10928	4276	3052	13668
Brownsville	14039	20166	6593	5502	21288
San Benito	71583	101565	46135	41903	106476
Los Fresnos	26920	45639	10360	4896	54555
Cameron #16	2018	3178	895	685	3545
Delta Lake	85895	119767	52940	39718	159016
Donna	51186	72891	34639	29740	89214
Engelman	7055	10751	3899	2941	13023
Harlingen	41529	57260	24440	16724	64854
Edinburg	48010	84325	19154	9970	101281
San Juan	74851	105221	52773	44235	134174
McAllen #3	7343	16941	2313	684	56218
Progreso	9143	13917	5020	4184	16809
Mission #6	16144	24770	8723	1024	30599
United	30007	44054	18966	11914	55037
Mercedes	99925	147596	60949	46703	166103
Baptist Seminary	1544	3086	578	304	5024
Mission #16	13365	21816	7789	4773	25381
Monte Grande	1812	3733	385	37	5505
Sharyland Plantation	6480	13169	212	135	15794
La Feria	43373	67026	24259	19536	84605
Santa Cruz	33493	50642	18703	4383	57686
Santa Maria	5786	9432	3115	2604	10183
Maverick	74841	120506	37801	32780	144976
Valley Acres	8393	11137	5649	583	13502
MUD	1112	1618	605	510	2384
Total	793156	1195285	456836	334166	1468507

[1] The average of the five highest years were used to calculate potential water savings for "normal" water supply conditions

Table 10 (V-1). Classification of the sources of water loss in irrigation districts.

Transportation	Accounting	Operation
1) seepage in main, unlined canals 2) seepage in secondary and tertiary unlined canals (laterals) 3) leakage from lined canals 4) leakage from pipelines 5) evaporation (canals, reservoirs, resacas) 6) leaking gates and valves	1) accuracy of field-level deliveries (estimates of canal riders/irrigators) 2) unauthorized use 3) metering at main pumping plant 4) water rights accounting system	1) charging empty pipelines and canals 2) spills 3) partial use of water in dead-end lines

Table11a (V-2). Seepage loss rates of "concrete" canals measured in Region M by the ITC.

Canal ID	Soil Type	Top Width (ft)	Loss Rate (in/day)	Loss Rate (gal/ft^2/day)	Loss Rate (ac-ft/mi/yr)
MA4	silty clay loam, sandy clay loam	12	21.73	8.82	493.5
SJ4[a]	silty clay	15	2.1	1.17	111.2
LF1	sandy clay loam, fine sandy loam	12	3.96	1.77	152.92
LF2	sandy clay loam, fine sandy loam	12	11.64	4.61	369.05
UN2[b]	fine sandy loam	8	4.65	2.09	121.2
SJ5[c]	silty clay	14	3.06	1.38	145.5
UN1[d]	sandy clay loam, fine sandy loam	12	5.29	2.32	217.7
16HC2	fine sandy loam	13	2.89	1.41	121.3
SJ10	sandy clay loam	17.32	1.18	0.57	61
SJ12[e]	silty clay	16	2.82	1.35	117.7

a This section was relined with new dimensions and the tested section no longer exists.
b This section was changed to pipeline and the tested canal section no longer exists.
c This section was relined with new dimensions and the tested section no longer exists.
d This section was changed to pipeline and the tested canal section no longer exists.
e This section was relined with new dimensions and the tested section no longer exists.

Table 11b (V-3). Seepage loss rates of unlined canals measured in Region M by the ITC.					
Canal ID	Soil Type	Top Width (ft)	Loss Rate (in/day)	Loss Rate (gal/ft^2/day)	Loss Rate (ac-ft/mi/yr)
MA3	silty clay loam	20.7	33.29	13.85	1690.1
SB8	clay loam	18.5	1.42	0.83	156.09
SB3	silty clay loam	25	13.07	6.69	1095.72
SB7	sandy clay loam	17	0.75	0.42	47.35
SB6	sandy clay loam	20	2.65	1.44	188.99
SB5	sandy clay loam	18	2.98	1.67	188.31
SB4	clay loam	16	1.17	0.64	68.33
BR1	silt loam	40	5.04	3.14	794.6
RV1	clay	24	0.25	0.15	23

Table11c (V-2). Total loss rates of "concrete" canals measured by the ITC in Region M.

Canal ID	Overall Rating	Soil Type	Top Width (ft)	Loss Rate (in/day)	Loss Rate (gal/ft^2/day)	Loss Rate (ac-ft/mi/yr)
SJ1[a]	4.96	sandy clay loam	12	5.35	2.42	153.68
DL2	3.88	sandy clay loam, fine sandy loam	6	9.96	4.12	236.18
DL1	4.24	sandy clay loam	19	0.31	0.16	18.78
ME1	3.52	sandy clay loam, fine sandy loam	38		1.26	281.85
HA2	4.6	sandy clay loam, fine sandy loam	9	5.21	2.28	135.87
SJ8	3.88	sandy clay loam	17		1.86	199.10
BV1	2.44	silty clay loam, silty clay loam	9	19.06	7.97	510.49
UN3		fine sandy loam	19	4.49	2.02	154.30
HA1	5.32	sandy clay loam, clay loam	15	1.20	0.63	45.51
ED3	4.96	sandy clay loam	3	34.19	10.19	307.08
ED1	2.08	sandy clay loam	6	82.08	34.31	1519.41
ED4	6.4	sandy clay loam	4	68.49	19.16	581.63
ED2	3.52	sandy clay loam	6	50.73	21.53	858.24
SJ7[b]	6.76	silty clay loam, silty clay	18	3.82	1.98	228.40
ME2	4.96	sandy clay loam, clay loam		1.88	163.48	1.88
SJ6[c]		silty clay	12	3.99	1.88	163.83
16HC 1		fine sandy loam	14		1.89	192.37
DO1		sandy clay loam	5	4.91	1.68	65.24
DO3		sandy clay loam	6	9.47	2.71	107.20
DO2		sandy clay loam	6	6.67	2.18	121.52
SJ9		sandy clay loam, clay loam	15	4.20	2.03	213.01
SJ11		sandy clay loam	17	1.1	0.55	59.00
SJ13[d]		silty clay	16	0.6	0.29	26.8

a This section was changed to pipeline and the tested canal section no longer exists.
b This section was relined with new dimensions and the tested section no longer exists.
c This section was relined with new dimensions and the tested section no longer exists.
d This section was relined with new dimensions and the tested section no longer exists.

Table11d (V-3). Total loss rates of unlined canals measured by the ITC in Region M..						
Canal ID	Overall Rating	Soil Type	Top Width (ft)	Loss Rate (in/day)	Loss Rate (gal/ft^2/day)	Loss Rate (ac-ft/mi/yr)
MA2		silty clay loam, sandy clay loam	205	5.90	3.18	275.73
MA1		clay loam, sandy clay loam	50	0.85	0.46	150.94
BV3	3.88	silty clay, silty clay loam	46	0.52	0.15	53.40
SJ2	6.76	clay	23	2.17	1.06	160.17
ED5[a]	4.96	fine sandy loam	81	4.11	2.39	1213.15
SB1[b]		clay loam	29	2.25	1.22	215.4
HA3	6.4	sandy clay loam, clay loam	15		0.64	45.53
ED6	5.68	fine sandy loam, clay loam	45		8.53	451.54
SJ3	4.96	clay, silty clay	30	0.83	0.45	61.60
BV2		clay, silty clay loam	9	24.48	8.53	451.54
SB2		clay loam	24	2.51	1.39	149.06

a The upstream end of this section was re-routed and the tested section no longer exists.
b This section was changed to pipeline and the tested canal section no longer exists.

Table 11e. Loss rates of canals lined with a geo-membrane overlaid with shotcrete measured by the ITC in Region M..						
Canal ID	Test Type	Soil Type	Top Width (ft)	Loss Rate (in/day)	Loss Rate (gal/ft^2/day)	Loss Rate (ac-ft/mi/yr)
SJ12	Total	Silty clay	16	2.82	1.35	117.7
SJ13	Seepage	silty clay	16	0.6	0.29	26.8

Table 12 (V-4). Spill loss and recovery sites monitored previously.		
Spill Site ID	**Rate*** (ac-ft/yr)	**Spill Type**
Rio Farms	510	Loss
J-System	28	Loss
M-Reservoir	1118	Loss
M-Reservoir	4684	Recovery

* during the period of 1999-2000

Table 13 (VI-1). Water savings observed or estimated from metering, poly pipe, and surge flow irrigation demonstrations in the Lower Rio Grande Valley during the 1990's.	
District	**Water Savings Observed**
Bayview	36%[1]
Brownsville	33%[1]
Donna	20%[2]
La Feria	10%[2]
Delta Lake	33%[1]
San Benito	40%[1]

[1] may include additional benefits from implementing improved on-farm water management practices or due to changes in irrigation technology

[2] metering only

Table 14a (VI-2). Factors used for calculating on-farm water saving potential.		
Technique	**Expected Water Savings**	**Factor Used**
Metering/measurement	0 - 15 %	10 %
poly/gated pipe replacement of field ditches/siphon tubes	5 - 20 %	12.5 %
high management/improved irrigation technology	10 - 30 %	20 %

Table 14b (VI-3). Example of the assumptions for applying water savings factors in Table VI-2 to determine on-farm potential water savings.	
Technique	**Assumptions for Calculations**
water measurement/metering	- 54% of region is under consistent water measurement or metering - factor applied to remaining 46%
poly/gated pipe	- will be adopted in 90% of LRGV - 36% of the LRGV already using gated/poly pipe - factor applied to remaining 0.36 of area not currently using poly/gated pipe (0.9 - 0.36 = 0.54)
high management/improved irrigation technology	- will be adopted in 90% of LRGV - approximately 30% of area currently under high management or using improved technologies - factor applied to 50% of area (0.9 - 0.3 = 0.6)

Table 14c (VI-4). On-farm water savings factors used for calculating county potential water savings.	
Counties	**Overall On-farm Water Saving Factor**
Hidalgo, Cameron	0.234
Web, Zapata, Jim Hogg	0
Starr	0.060
Maverick	0.134
Willacy	0.188

Table 15 (VI-5). Potential savings in irrigation districts by increasing the average conveyance efficiency to 90%.

County	Average Conveyance Efficiency (%)	Water Supply Scenario (ac-ft)		Water Savings Potential (ac-ft)	
		Normal	Drought	Normal	Drought
Cameron	68.0	330,986	228,142	72,817	50,191
Willacy	70.0	51,913	35,067	10,383	7,013
Hidalgo	71.0	695,664	439,046	132,176	83,419
Maverick	67.0	120,506	59,869	27,716	13,770
Total	69.7	1,199,069	762,124	243,092	154,393

Note: county water supply under drought were adjusted to account for irrigation districts that service areas in more than one county as follows: Delta Lake (43%Wilacy, 57% Hidalgo); Mercedes (96% Hidalgo, 4% Cameron); Valley Acres (87% Hidalgo, 13% Cameron).

Table 16a (VI-6). Achievable on-farm water saving potential under drought water supply conditions with conveyance efficiency improvements. No significant savings are projected for Jim Hogg, Webb and Zapata Counties.

Practice	On-farm Water Savings with Conveyance Efficiency Improvement for Drought of Record (ac-ft/yr)					
	Cameron	Willacy	Hidalgo	Maverick	Starr	Total
Measurement	10,420	0	17,243	0	0	27,663
Gated pipe	15,403	2,275	28,753	488	0	46,919
Improved management/ technology	27,562	4,317	56,741	7,894	1,516	98,030
Total	53,385	6,592	102,737	8,382	1,516	172,612

Table 16b (VI-7). Achievable on-farm water saving potential under normal water supply conditions with conveyance efficiency improvements. No significant savings are projected for Jim Hogg, Webb and Zapata Counties.

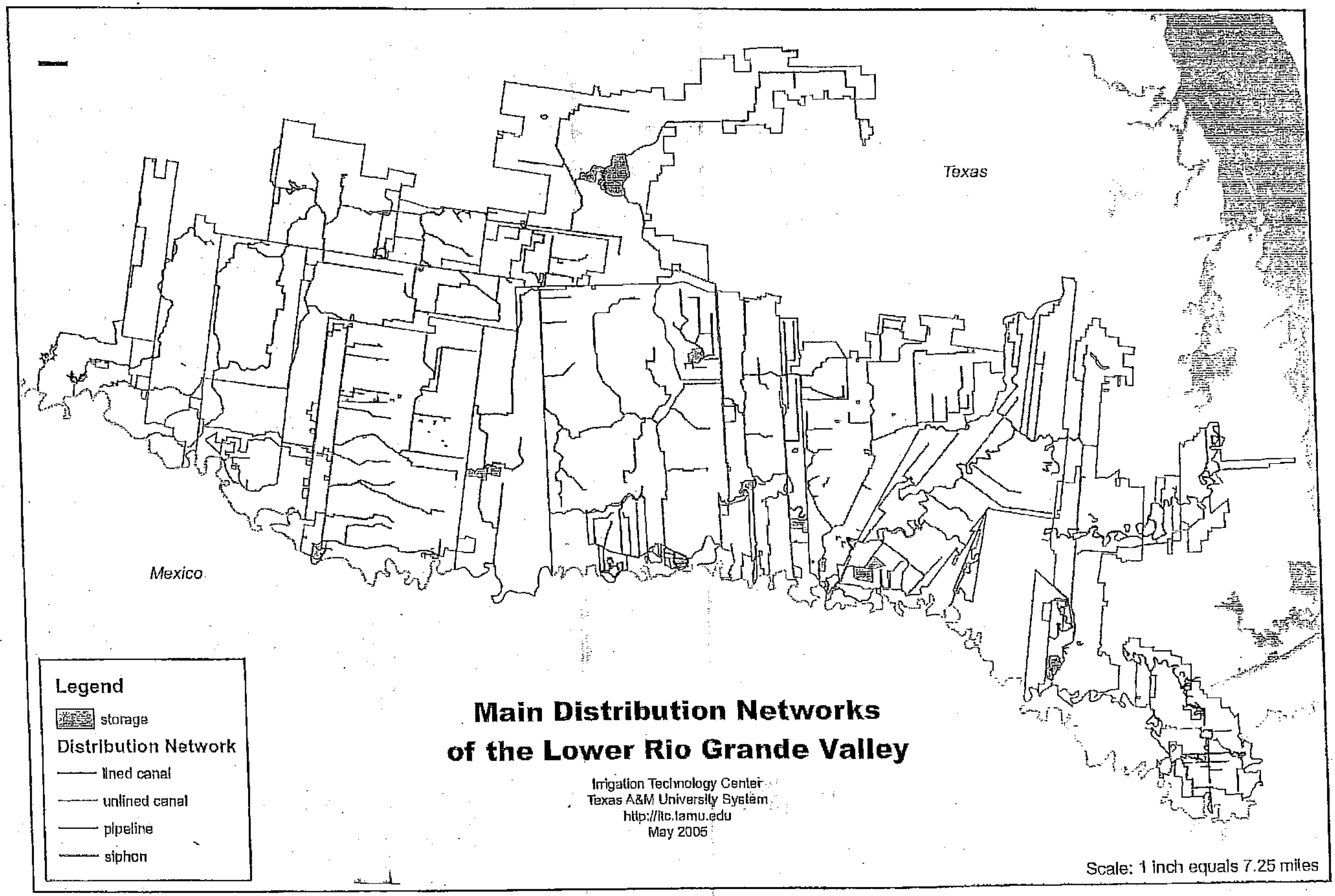
Practice	On-farm Water Savings with Conveyance Efficiency Improvement for Normal Water Supply Conditions (ac-ft/yr)					
	Cameron	Willacy	Hidalgo	Maverick	Starr	Total
Measurement	12,714	0	25,809	0	0	38,523
Gated pipe	18,795	2,927	38,153	1,438	0	61,313
Improved management/ Technology	45,938	6,833	98,823	14,709	7,894	174,197
Total	77,447	9,760	162,785	16,147	7,894	274,033

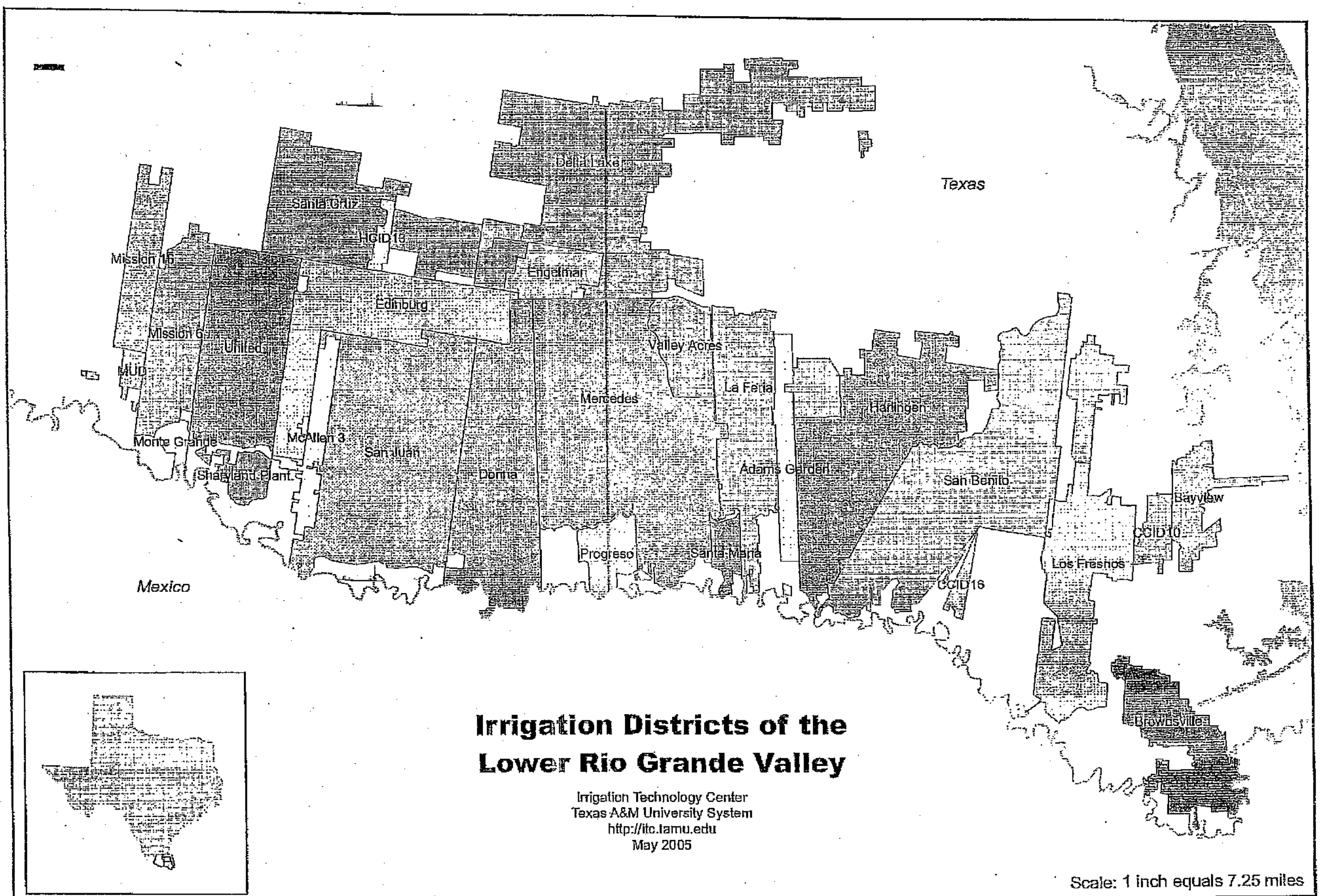
Table 17a (VI-8). Achievable on-farm water saving potential under drought water supply conditions with no conveyance efficiency improvements. No significant savings are projected for Jim Hogg, Webb and Zapata Counties.

Practice	On-farm Water Savings without Conveyance Efficiency Improvement for Drought of Record (ac-ft/yr)					
	Cameron	Willacy	Hidalgo	Maverick	Starr	Total
Measurement	3,980	0	7,200	0	0	11,180
Gated pipe	6,900	1,600	13,100	0	0	21,600
Improved management/ technology	12,600	3,400	42,000	4,000	1,516	63,516
Total	23,480	5,000	62,300	4,000	1,516	96,296

Table 17b (VI-9). Achievable on-farm water saving potential under normal water supply conditions with no conveyance efficiency improvements. No significant savings are projected for Jim Hogg, Webb and Zapata Counties.

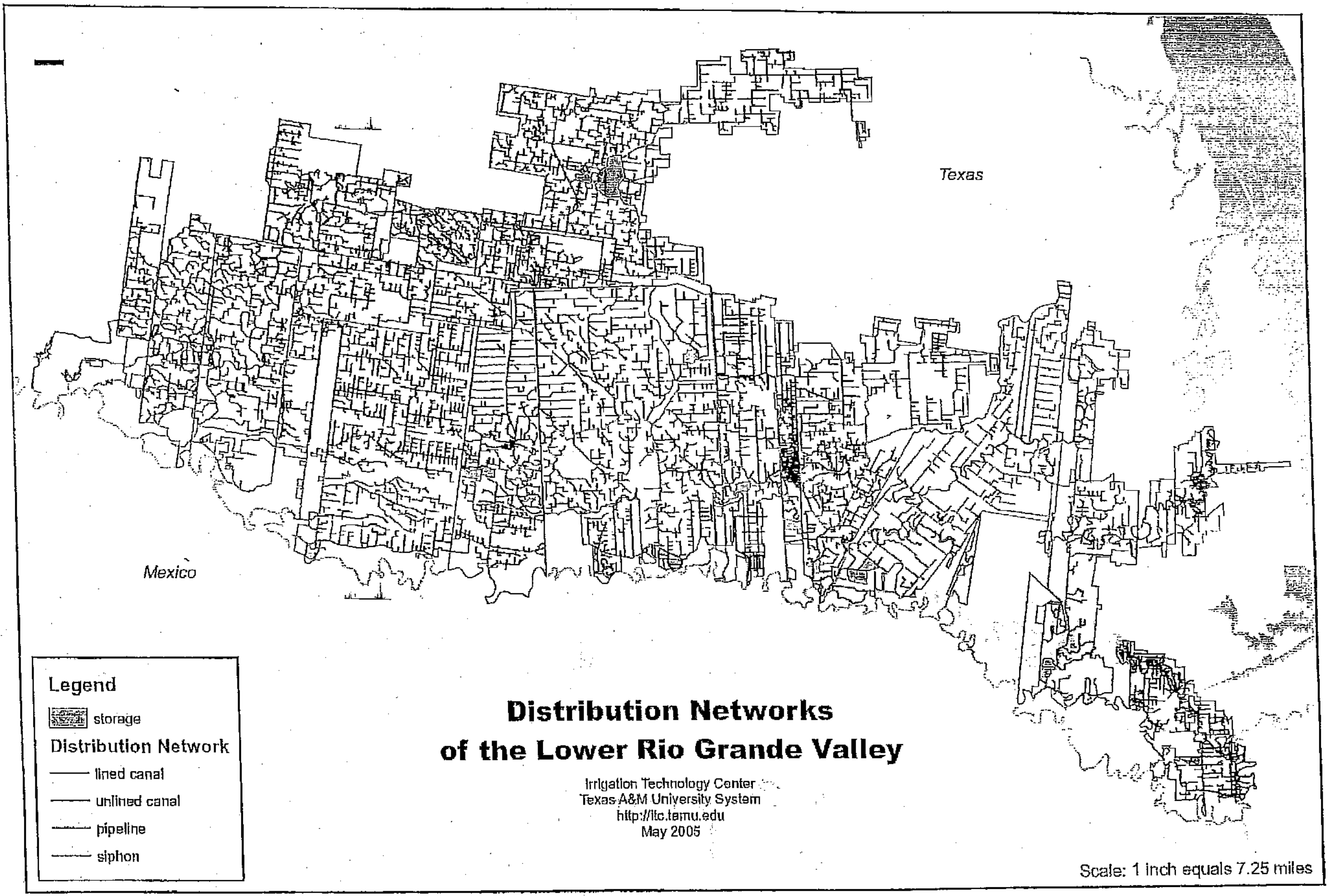
Practice	On-farm Water Savings without Conveyance Efficiency Improvement for Normal Water Supply Conditions (ac-ft/yr)					
	Cameron	Willacy	Hidalgo	Maverick	Starr	Total
Measurement	4,700	0	8,700	0	0	13,400
Gated pipe	8,500	2,000	16,000	1,100	0	27,600
Improved management/ Technology	15,400	4,100	50,800	6,000	7,894	84,194
Total	28,600	6,100	75,500	7,100	7,894	125,194


Texas
Mexico
Legend
storage
Distribution Network
lined canal
unlined canal
pipeline
siphon
Main Distribution Networks
of the Lower Rio Grande Valley
Irrigation Technology Center
Texas A&M University System
http://itc.tamu.edu
May 2005
Scale: 1 inch equals 7.25 miles



Irrigation Districts of the Lower Rio Grande Valley

Irrigation Technology Center
Texas A&M University System
http://itc.tamu.edu
May 2005



Texas
Mexico
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Distribution Network
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Distribution Networks
of the Lower Rio Grande Valley
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May 2005
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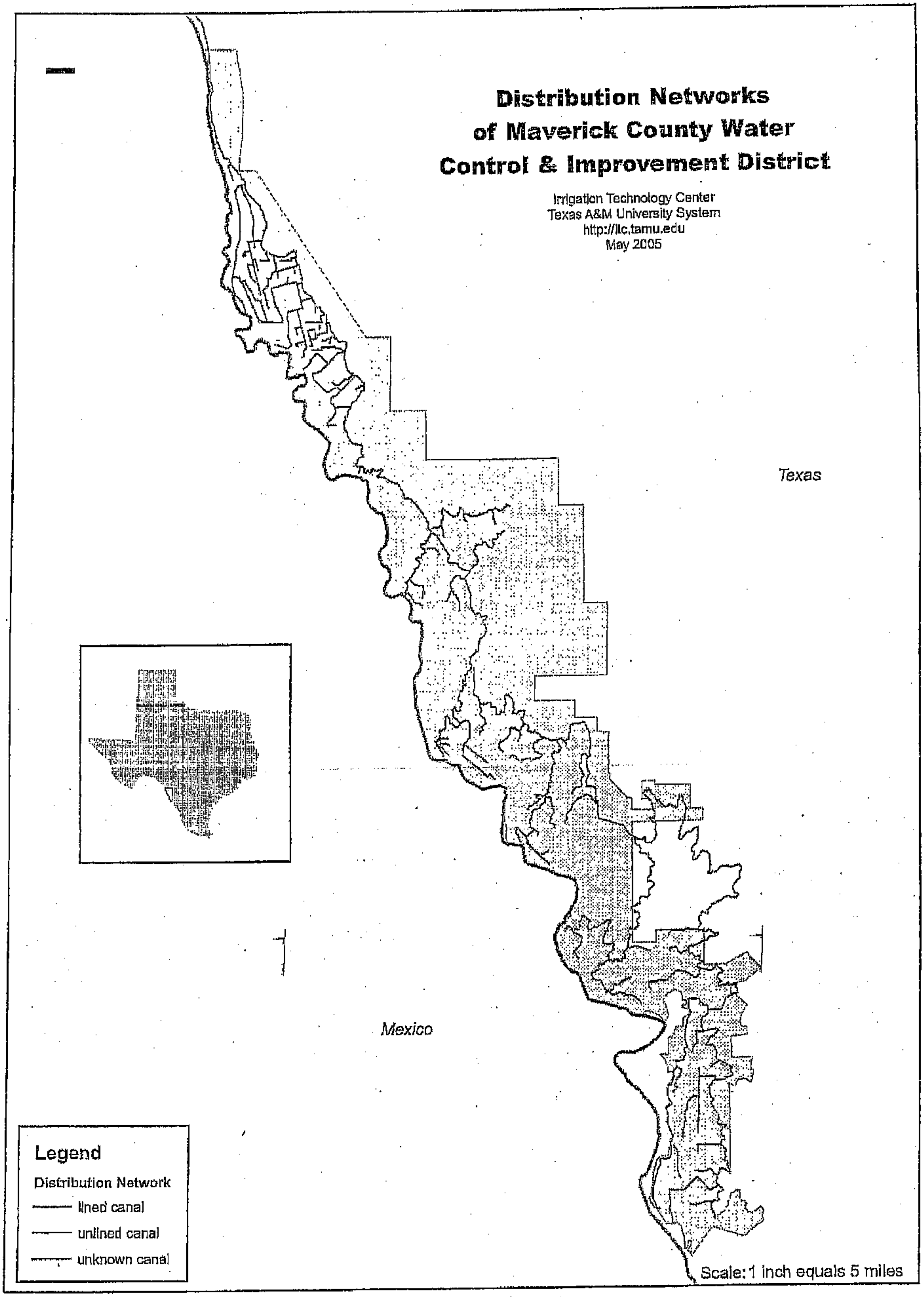
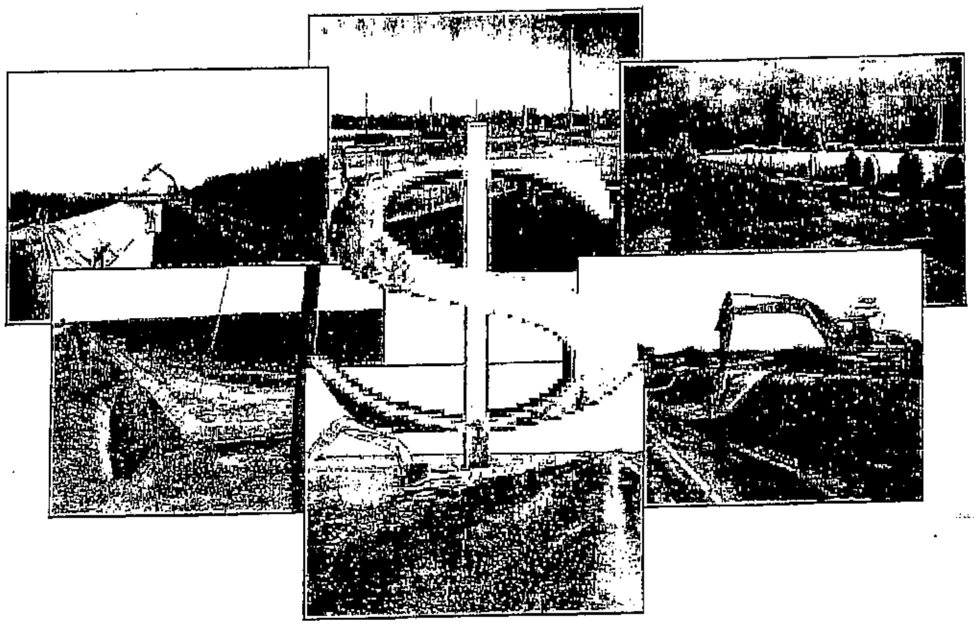

Distribution Networks
of Maverick County Water
Control & Improvement District
Irrigation Technology Center
Texas A&M University System
http://itc.tamu.edu
May 2005
Texas
Mexico
Legend
Distribution Network
lined canal
unlined canal
unknown canal
Scale: 1 inch equals 5 miles

Estimating the Required Investment to Attain Region M Water Savings Through Rehabilitation of Water-Delivery Infrastructure – 2005 Perspectives



FINAL REPORT
proposal # 05-60415

Prepared for:

REGION M WATER PLANNING COMMITTEE
c/o NRS Consulting Engineers
HARLINGEN, TEXAS

MARCH 15, 2005

Prepared by:

Texas Agricultural Experiment Station and
Texas Water Resources Institute
of the Texas A&M University System

Texas Water Resources Institute Report:
TR-280

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Preface

In the 1990s, water emerged as a critical issue for the Texas Lower Rio Grande Valley (LRGV) (Region M in the Texas water planning activity) because of rapid population growth, a prolonged drought, and shortfalls in delivery of water from Mexico over many years. Opportunities for and investigations into easing the stress from limited water has taken many paths, with water conservation in irrigation district water-conveyance systems being a major area of focus.

The issue is twofold – estimating the potential water savings and then identifying the expected costs to achieve those savings in the LRGV irrigation districts. This report brings together the current estimates of potential water savings within LRGV irrigation districts and the economics of achieving the savings. The material presented herein provides such an estimate, as well as the methods and data used in calculating the estimate. Periodic updating is an important component of regional water planning for Region M.

Acknowledgments

As this report relies heavily upon prior economic analyses by the authors, we wish to reiterate our appreciation to the many collaborators and associates who selflessly assisted, for without their prior assistance, this work would not have been possible. A detailed listing can be found in Rister et al. 2004. In summary, however, we sincerely thank those many individuals from the Lower Rio Grande Valley irrigation districts, consulting engineering firms, U.S. Bureau of Reclamation, Texas Water Development Board, Texas Water Resources Institute, and our peers and associates in the Agricultural Economics and the Biological and Agricultural Engineering Departments at Texas A&M University who furthered our efforts in many ways. Also, we thank the Region M Water Planning Committee, and in particular Bill Norris with NRS Consulting Engineers, for allowing us the opportunity to assist.

Abstract

Irrigation districts in the Texas Lower Rio Grande Valley use an antiquated water-delivery conveyance system; which loses substantial water from seepage, evaporation, etc. Pressures are increasing for districts to improve their operational efficiencies. Rehabilitation of the system has been estimated to save approximately 211,000 ac-ft of water annually; which can benefit agricultural, municipal, and industrial users in the region. Combining these estimated savings with prior economic and financial analyses of 17 proposed rehabilitative project components result in an extrapolated estimated required initial capital investment of $157.8 million in rehabilitative measures to attain the 211,000 ac-ft of annual savings. A caveat to the exactness of this dollar estimate is warranted, however, because this single-point estimate is built upon other estimates (e.g., water savings, initial construction costs, etc.) by irrigation district management, consulting engineers, and university scientists. Future application of on-going economic work, combined with an 'in-process' revised estimate of potential water savings (i.e., from the current 211,000 ac-ft), could provide an improved investment estimate in the future.

Estimating the Required Investment to Attain Region M Water Savings Through Rehabilitation of Water-Delivery Infrastructure – 2005 Perspectives

by:

Ronald D. Lacewell; Professor, Assistant Vice Chancellor, and Associate Director [a,b,c]
M. Edward Rister; Professor and Associate Head [a,b]
Allen W. Sturdivant; Extension Associate [a,d]

Issue Background[e]

Senate Bill 1 in 1997 created the State's (i.e., Texas') regional water planning process, in which 16 Regional Water Planning Groups were formed to assess the water needs of each region and to develop regional water plans to meet those needs. Those plans, overseen by the Texas Water Development Board (TWDB), became the basis for the first State Water Plan that evolved from local and regional efforts rather than being developed centrally out of Austin. The 2002 State Water Plan catalogued $18 billion worth of water projects to meet future needs. Senate Bill 2 in 2001 provided for amendments and refinements to the regional water planning process, which are still ongoing (Bowen). The area known as the Lower Rio Grande Valley (LRGV) in south Texas is part of the Region M water-planning area.

Approximately 98 percent of raw water demanded by agriculture, municipal, and industrial users in Region M is delivered by local irrigation districts (IDs). Many of these IDs rely on an dated conveyance system of pipelines, canals, laterals, pumping facilities, etc. The diminished abilities of IDs to efficiently provide delivery services with this dated system has been exacerbated by a simultaneous increase in urban water demand and a fluctuating supply of water in the LRGV. This two-sided squeeze, along with other changing socio-economic factors, has intensified the need for IDs to improve their delivery efficiencies which range from 40-90% (Fipps and Pope). Various local, regional, state, and federal stakeholders are familiar with the needed improvements and have provided assistance in diverse ways.

Previously and without regard to comprehensive project costs, the Texas Cooperative Extension (TCE) quantified preliminary water-saving potential via infrastructure rehabilitation.[1] Specifically, Fipps estimated in calendar year 2000[2] a potential 159,631 to 210,944 ac-ft of water-savings with improvements to the LRGV water-delivery infrastructure system.[3]

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e Note that superscript numbers in the text refer to 'Endnotes' found at the back of this report.

Table 1. Estimated Potential Water Savings with Improvements to the LRGV Water-Conveyance Infrastructure System.

Water Supply Conditions	District Conveyance Efficiency Improvement (ac-ft)
drought	159,631
normal	210,944

Source: This is a partial reproduction of the water-savings estimates contained in Fipps' (2000) technical memorandum.

Fipps concluded, assuming a "normal" water-supply year,[4] that almost 211,000 ac-ft of annual water savings could be realized with improvements to the ID conveyance system. Fipps' (2000) method:

(a) extrapolated that high diversions from the Rio Grande translated into a large available supply of water, which therefore translated into a 'normal' water-supply year, and
(b) assumed that the estimated average delivery efficiency of 70.8% could be increased to 90% across all IDs in the LRGV.

Fipps' (2000) work, along with that of many others, precipitated a broad initiative focused on identifying, prioritizing, and implementing projects to improve the LRGV water-delivery infrastructure. Various agencies and organizations are providing financing for these projects, including:

(1) $6.5 million in U.S. Congressional appropriations (in FYs 2003-04) via the U.S. Bureau of Reclamation (USBR) [of $85 million in federal authorizations during FYs 2000 and 2002];
(2) $25.6 million in grants (in FY 2003) from the North American Development Bank (NADB);
(3) $3.8 million in State Energy Conservation Office (SECO) funding for project analyses and development channeled through the TWDB; and
(4) additional internally-generated funds by the IDs (Rister et al. 2004).

Also of note are Texas Agriculture Experiment Station (TAES) and TCE agricultural economists' collaborative efforts with the USBR, NADB, TWDB, IDs, and several consulting engineers to provide estimates of costs-of-saving-water using the spreadsheet model RGIDECON© (Rister et al. 2002) on projects proposed to the USBR by IDs during 2003-2005.[5] Because of these analyses, TAES and TCE have access to unique construction cost and water-savings data appropriate for use in estimating the required investment (basis 2005 dollars) to attain Region M water savings via rehabilitation of the LRGV water-delivery infrastructure.

Issue and Purpose Statements

To date, beyond pure speculation, no comprehensive, economically and financially-based estimate of the total construction-cost funding required to attain the potential 211,000 ac-ft of water savings in Region M has been calculated and published. TAES/TCE economists address this shortcoming herein with an objective estimate of the capital investment funding (basis 2005 dollars) required to attain such savings.

The need for this estimate originates with the Region M water-planning committee's effort to update and submit its revised plan to the TWDB in 2005. Region M's possession of this information will:

(a) allow Region M to more accurately describe and quantify the "problem" to other stakeholders and policymakers;
(b) provide confidence that the action plan developed by local, regional, state, and federal agencies reasonably reflects the level of needs in the LRGV water-delivery infrastructure; and
(c) provide valuable data which refines and improves the updated Region M water plan.

Methodology

With a projected future imbalance in Region M's water supply (Rio Grande Regional Water Planning Group), the priority for establishing funding for rehabilitation is elevated. With this noted, estimating potential construction costs to attain a specified level of water savings on yet undefined projects is more complex, and inherently subject to more criticism than standard project costing of a known set of defined projects.[6] Thus, in lieu of a pre-defined, targeted, full set of projects capable of attaining the entire 211,000 ac-ft of potential savings, TAES/TCE economists use previously-completed work for several project components (e.g., Rister et al. 2004) to serve as a basis for making an extrapolated estimate herein. That is, several LRGV ID projects (made up of one or more project components) and their related data, analyzed for their economic and financial *cost-of-saving-water* (with RGIDECON©) (**Tables 2 and 3**), provide a basis of construction costs, anticipated water savings, etc., from which to estimate the level of needed investment for yet-to-be-determined projects.[7] In summary, different project components representing three project types (e.g., meters and telemetry, linings, and pipelines) previously identified by ID managers and consulting engineers were organized by type, aggregated, and then combined with Fipps' (2000) estimated water savings to extrapolate a baseline investment-requirement estimate.

The approach followed herein is based on the premise that the current process of project selection (e.g., planning, design, funding, etc.) and construction will continue to be similar (i.e., *status quo*) to that currently observed across Region M stakeholders as a whole. Further, 17 project components previously analyzed by TAES/TCE (**Table 2**)[8] are assumed to be representative of the additional projects required to accomplish the total 211,000 ac-ft of water savings potential previously estimated by Fipps (2000).[9]

Extrapolated Results and Assumptions

For the baseline extrapolated results, it is estimated **$157.8 million** of initial capital investment in the water-delivery system (in Region M) will be required to attain the estimated 211,000 ac-ft of annual water savings estimated by Fipps (2000). Inherent assumptions in this forecast baseline value include:

(1) all project components analyzed by TAES/TCE will be built;
(2) all data received from ID managers and consulting engineers about construction costs, water savings, life expectancies, etc. are accurate, being neither under- nor over-represented; and
(3) a constant (i.e., linear) relationship between the average cost of a project/component and its estimated waters savings is expected (i.e., marginal costs to attain savings are not increasing, or decreasing).

The $157.8 million estimate is an extrapolated value determined by (a) dividing the annuity equivalent[10] of water savings of 53,602 ac-ft identified in the 17 components (**Table 2**) evaluated by TAES/TCE into the total estimated water-savings potential of 211,000 ac-ft (Fipps 2000), and then (b) multiplying that ratio by the initial investment cost of $40,089,121 for the 17 components (**Table 2**), as shown below:

$$\frac{\textit{total estimated water-savings potential}}{\textit{annuity equivalent water savings}} \times \textit{\$ initial investment of 17 analyzed components} = \textit{\$ extrapolated total investment required}$$

$$\frac{211{,}000 \text{ ac-ft}}{53{,}602 \text{ ac-ft}} \times \$\,40{,}089{,}121 = \$\,157{,}806{,}657\,.$$

Table 2. Key Input and Results for 17 LRGV Irrigation District Project Components Analyzed in the *Baseline, Status-Quo* Results, Grouped by Project Type, 2005.

Project Type / ID / Component	Estimated Initial Construction Cost ($)	Expected Useful Life (years)	Estimated Annual Water Savings (ac-ft)	Calculated Annuity Equivalent of Water Savings (ac-ft)	Net Change in Annual O&M Expenses ($/year)	Cost of Saving Water ($/ac-ft)	Length (miles)
Meters & Telemetry							
1 - CCID #1 (Harlingen)	$756,761	15	2,022	1,855	$83,375	$ 84	-
2 - HCID #2 (San Juan)	$564,500	20	280	261	($22,294)	$ 81	-
sub-aggregate	$1,321,261		2,302	2,116	$61,081	$ 83	n/a
Lining							
3 - CCID #1 (Harlingen)	$349,031	20	961	895	($2,960)	$ 23	2.45
4 - CCID #2 (San Benito)	$3,585,300	49	9,557	9,129	$1,704	$ 23	2.39
5 - CCID #2 (San Benito)	$3,296,000	49	7,503	7,167	($3,997)	$ 26	13.98
6 - CCID #2 (San Benito)	$2,996,000	49	4,536	4,333	($2,033)	$ 41	9.33
7 - HCID #2 (San Juan)	$3,154,200	49	2,661	2,542	$300	$ 74	7.26
8 - HCID #2 (San Juan)	$2,495,000	49	644	615	$0	$ 251	5.34
9 - MCWCID #1 (Eagle Pass)	$4,509,819	49	8,463	8,084	($23,211)	$ 33	3.00
sub-aggregate	$20,385,350		34,325	32,765	($30,197)	$ 37	43.75
Pipeline							
10 - Brownsville ID	$2,356,000	49	1,959	1,872	($68,308)	$ 28	2.31
11 - CCID #1 (Harlingen)	$1,397,786	49	2,381	2,275	($8,492)	$ 27	6.07
12 - CCID #2 (San Benito)	$4,396,000	49	6,089	5,817	($24,865)	$ 40	11.65
13 - CCID #2 (San Benito)	$2,646,000	49	1,694	1,618	($11,549)	$ 93	7.22
14 - CCID #2 (San Benito)	$826,000	49	675	645	($4,962)	$ 70	2.04
15 - HCID #1 (Edinburg)	$1,333,299	49	2,364	2,258	($15,621)	$ 25	1.12
16 - HCID #1 (Edinburg)	$3,847,125	48	3,412	3,259	($70,431)	$ 16	5.42
17 - HCID #2 (San Juan)	$1,580,300	49	1,023	977	($17,192)	$ 71	1.98
sub-aggregate	$16,802,210		19,597	18,721	($221,420)	$ 40	37.81
Overall Aggregate	$40,089,121	n/a	56,225	53,602	($190,536)	$ 40	81.56

Extended Analyses and Results

Beyond the extrapolated investment estimate, the analysis by TAES/TCE economists also lends itself to providing other related and useful information which is shared here. The co-product of this analysis, or the *cost-of-saving-water*, is also discussed because of its key relevance and interactive relationship with the $157.8 million extrapolated estimate (**Table 2**).

Annuity Equivalent

Here, we introduce the financial term *Annuity Equivalent* (AE), and explain two intermediate AE calculations which are the parameters used in determining the *cost-of-saving-water* values on a per acre foot (ac-ft) basis. [For additional information about AEs, refer to Rister et al. 2002 and appropriate finance and accounting text books].

'Annuity' is derived from annum, meaning yearly, while 'Equivalent' can be taken to mean uniform, so a literal translation in the area of finance would be "a uniform series of annual payments/costs."

Annuity Equivalent of Net Cost Stream – Water Savings ($/yr) - the annual (uniform) 'net impact' investment cost (basis CY 2005) associated with saving water, with a specified project component or aggregate group of projects. Zero salvage values and a continual replacement of the respective project/component(s) with similar capital items as their useful life ends are assumed.

Annuity Equivalent of Water Savings (ac-ft) - the annual (uniform) volume of water savings (basis CY 2005) provided by a project component or aggregate group of projects. A social-preference time value is incorporated in related calculations.

Dividing the first annuity equivalent by the second results in a $/ac-ft value which is the estimated *cost-of-saving-water*; a value depicting the 'net impact' cost (e.g., initial cost, O&M changes, energy cost changes, etc.) which accounts for time and inflation, thereby presenting the value in 2005 dollars. These values can be compared across project components with different useful lives on an 'apples-to-apples' basis.

That is, the *cost-of-saving-water* associated with the $157.8 million is an aggregated value of $40/ac-ft of water saved (basis 2005 dollars) (**Tables 2, 3,** and **4**). A closer look reveals the *cost-of-saving-water* ranges from $37/ac-ft to $83/ac-ft across the three project types analyzed. As described in Rister et al. 2002, the interpretation of these values are the costs per year, in present-day dollars, of saving one ac-ft of water into perpetuity through a continual series of replacements of the listed components, with all of their associated data input. With this, the 'net impact' (i.e., initial cost, longevity, changes in operations and maintenance costs, level of water savings, etc.) of a project/component over its life is considered, not just the initial construction cost. The net impact value is, obviously, a more realistic measure of a project/component's economic and financial worthiness than an estimate which ignores these factors.

The comprehensive financial analysis view encompassed in TAES/TCEs evaluation requires consideration of not only a project component's initial construction cost, but also other factors such as: how many years will the components be useful and save water, what is the impact of inflation and time, and what is the impact of changes in operations and maintenance costs (O&M), as well as what are the expected changes in energy costs, etc. Seldom is a capital asset purchased or built where the benefits are a one-time occurrence, and/or where the effects on O&M expenses end after the initial investment has been made. This 'net-impact' approach is known as *capital budgeting*, the preferred approach to project analysis by banks, businesses, and others involved in analyzing and comparing capital projects; and, the foundation supporting the results presented below. Engineers sometimes refer to this approach as *life-cycle costs* (Michalewicz).

The results of this 'net impact' method potentially allows for priority ranking of multiple projects and/or components on an apples-to-apples basis. This could be very useful information if optimization of the spending of limited project-investment monies was desired. As shown in **Tables 2** and 3, the lining projects/components provide the most 'bang for the buck' as they have the lowest *cost-of-saving-water* value, while the meters and telemetry are shown to be a relatively higher-costing rehabilitative measure analyzed here.

A detailed view of the aggregated *cost-of-saving-water* for all 17 components analyzed by TAES/TCE economists is provided in **Table 4**, with a breakdown of like data provided for the three individual project types (i.e., meters and telemetry, lining, and pipeline) provided in **Tables 5**, 6, and 7, respectively. Using component #1 in **Table** 4 and the text box information about 'Annuity Equivalents' from the previous page shows that dividing the A.E. of the net cost stream of $155,513/year by the A.E. of all water savings of 1,855 ac-ft/year results in an A.E., or *cost-of-saving-water* value of $83.83/ac-ft. Other *cost-of-saving-water* values are similarly calculated. Also presented in **Table 4** is an aggregate capital investment cost of $40,089,121 and an A.E. value of 53,602 ac-ft of water savings associated with the 17 components - - (these values correspond with replicate values found on Tables 2 and 3). Also, the aggregated *cost-of-saving-water* from rehabilitation is a calculated $39.77/ac-ft (i.e., which is highlighted, and corresponds to a rounded-up $40/ac-ft value in found in Tables 2 and 3).

A detailed look at the 2 meters and telemetry components in **Table 5** reveals a range of $80.88 - $83.83 per ac-ft cost of saving water, with an aggregated value for the 2 components of $83.46 per ac-ft, which corresponds to the rounded-down value of $83/ac-ft in **Tables 2** and **3**. Further, **Table 6** depicts a range of $22.58 - $251,35 per ac-ft cost of saving water with lining, with an aggregated value for the 7 lining components of $36.83 per ac-ft, which corresponds to the rounded-up value of $37/ac-ft in **Tables 2** and 3. Finally, a detailed look at the 8 pipeline components in **Table 7** reveals a range of $24.42 - $93.34 per ac-ft cost of saving water with pipelines, with an aggregated value for the 8 pipeline components of $39.97 per ac-ft, which corresponds to the rounded-up value of $40/ac-ft in **Tables 2 and 3**.

Table 3. Summary of Data and Results for 17 LRGV Irrigation District Project Components Analyzed by TAES/TCE, by Project Type, 2005.

	Project Type			
Item	Meters & Telemetry (2)	Lining (7)	Pipeline (8)	Aggregate (all 17)
Projects' Total Length (miles)	0	43.75	37.81	81.56
Estimated Initial Investment Cost ($)	$1,321,261	$20,385,350	$18,382,510	$40,089,121
Expected Useful Life (years)	15, 20	20, 49	48, 49	n/a
Net Changes in Annual O&M ($)	$ 61,081	($ 30,197)	($ 221,420)	$ (221,420)
Annuity Equivalent of Net Cost Stream – Water Savings ($/yr)	$ 176,606	$ 1,206,745	$ 748,296	$ 2,131,647
Annuity Equivalent of Water Savings (ac-ft/yr)	2,116	32,765	18,720	53,602
Cost of Saving Water ($AE/ac-ft)	$ 83	$ 37	$ 40	$ 40

Table 4. Economic and Financial Summary of 17 Selected Rehabilitative Project Components Analyzed by TAES/TCE.

Item	Component No. / ID Abbreviation / ID Common Name / Project Type								
	1 CCID #1 (Harlingen) Meters & Telemetry	2 HCID #2 (San Juan) Meters & Telemetry	3 CCID #1 (Harlingen) Lining	4 CCID #2 (San Benito) Lining	5 CCID #2 (San Benito) Lining	6 CCID #2 (San Benito) Lining	7 HCID #2 (San Juan) Lining	8 HCID #2 (San Juan) Lining	9 MCWCID #1 (Eagle Pass) Lining
Total Discount Period (years)	16	21	21	50	50	50	50	50	50
Cost Discount Rate -- Ag, $ (%)	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%
Discount Rate -- Water & Energy Volume (%)	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%
Cost of Water Saved									
NPV of Net Cost Stream ($)	$1,558,197	$245,552	$235,301	$3,206,881	$2,900,884	$2,764,563	$2,933,491	$2,395,243	$4,179,406
- annuity equivalent ($/yr)	$155,513	$21,093	$20,212	$207,017	$187,264	$178,464	$189,369	$154,622	$269,797
NPV of Capital Investment Costs ($)	$756,761	$564,500	$349,031	$3,585,300	$3,296,000	$2,996,000	$3,154,200	$2,495,000	$4,509,819
- annuity equivalent ($/yr)	$75,527	$48,491	$29,982	$231,445	$212,770	$193,404	$203,616	$161,062	$291,127
NPV of All Water Savings (ac-ft)	21,617	3,659	12,561	196,105	153,971	93,078	54,610	13,215	173,660
- annuity equivalent (ac-ft/yr)	1,855	261	895	9,129	7,167	4,333	2,542	615	8,084
NPV of Net Cost Stream per Ac-Ft of Water Savings	$72,082	$67,110	$18,733	$16,353	$18,841	$29,702	$53,718	$181,248	$24,067
Cost of Saving Water ($/ac-ft) [1]	$83.83	$80.88	$22.58	$22.68	$26.13	$41.19	$74.49	$251.35	$33.38

1 i.e., Annuity equivalent, assuming perpetuity, zero salvage values, and replacement with identical technology.

Table 4. Economic and Financial Summary of 17 Selected Rehabilitative Project Components Analyzed by TAES/TCE, continued.

Item	Component No. / ID Abbreviation / ID Common Name / Project Type								Aggregate (17 components)
	10 BID (Brownsville) Pipeline	11 CCID #1 (Harlingen) Pipeline	12 CCID #2 (San Benito) Pipeline	13 CCID #2 (San Benito) Pipeline	14 CCID #2 (San Benito) Pipeline	15 HCID #1 (Edinburg) Pipeline	16 HCID #1 (Edinburg) Pipeline	17 HCID #2 (San Juan) Pipeline	
Total Discount Period (years)	50	50	50	50	50	50	50	50	
Cost Discount Rate -- Ag, $ (%)	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	
Discount Rate -- Water and Energy Volume (%)	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	
Cost of Water Saved									
NPV of Net Cost Stream ($)	$811,403	$936,099	$3,637,960	$2,339,578	$696,657	$863,339	$1,232,675	$1,074,075	$32,011,302
- annuity equivalent ($/yr)	$52,379	$60,429	$234,845	$151,029	$44,972	$55,732	$79,574	$69,336	$2,131,647
NPV of Capital Investment Costs ($)	$2,356,000	$1,397,786	$4,396,000	$2,646,000	$826,000	$1,333,299	$3,847,125	$1,580,300	$40,089,121
- annuity equivalent ($/yr)	$152,089	$90,233	$283,779	$170,810	$53,322	$86,070	$241,976	$102,015	$2,627,717
NPV of All Water Savings (ac-ft)	40,208	48,869	124,954	34,760	13,849	48,509	70,013	20,989	1,171,269
- annuity equivalent (ac-ft/yr)	1,872	2,275	5,817	1,618	645	2,258	3,259	977	53,602
NPV of Net Cost Stream per Ac-Ft of Water Savings	$20,180	$19,155	$29,114	$67,307	$50,302	$17,798	$17,606	$51,174	
Cost of Saving Water ($/ac-ft) [1]	$27.99	$26.56	$40.38	$93.34	$69.76	$24.68	$24.42	$70.97	$39.77

1 i.e., Annuity equivalent, assuming perpetuity, zero salvage values, and replacement with identical technology.

Table 5. Economic and Financial Summary of 2 Meters & Telemetry Project Components Analyzed by TAES/TCE.

Item	Component No. / ID Abbreviation / ID Common Name / Project Type		Aggregate (2 components)
	1 CCID #1 (Harlingen) Meters & Telemetry	2 HCID #2 (San Juan) Meters & Telemetry	
Total Discount Period (years)	16	21	
Cost Discount Rate -- Ag, $ (%)	6.1250%	6.1250%	
Discount Rate -- Water and Energy Volume (%)	4.0000%	4.0000%	
Cost of Water Saved			
NPV of Net Cost Stream ($)	$1,558,197	$245,552	$1,803,748
- annuity equivalent ($/yr)	$155,513	$21,093	$176,606
NPV of Capital Investment Costs ($)	$756,761	$564,500	$1,321,261
- annuity equivalent ($/yr)	$75,527	$48,491	$124,018
NPV of All Water Savings (ac-ft)	21,617	3,659	25,276
- annuity equivalent (ac-ft/yr)	1,855	261	2,116
NPV of Net Cost Stream per Ac-Ft of Water Savings	$72,082	$67,110	
Cost of Saving Water ($/ac-ft) [1]	$83.83	$80.88	$83.46

[1] i.e., Annuity equivalent, assuming perpetuity, zero salvage values, and replacement with identical technology.

Table 6. Economic and Financial Summary of 7 Lining Project Components Analyzed by TAES/TCE.

Item	Component No. / ID Abbreviation / ID Common Name / Project Type							Aggregate (7 components)
	3 CCID #1 (Harlingen) Lining	4 CCID #2 (San Benito) Lining	5 CCID #2 (San Benito) Lining	6 CCID #2 (San Benito) Lining	7 HCID #2 (San Juan) Lining	8 HCID #2 (San Juan) Lining	9 MCWCID #1 (Eagle Pass) Lining	
Total Discount Period (years)	21	50	50	50	50	50	50	
Cost Discount Rate -- Ag, $ (%)	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	
Discount Rate -- Water and Energy Volume (%)	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	
Cost of Water Saved								
NPV of Net Cost Stream ($)	$235,301	$3,206,881	$2,900,884	$2,764,563	$2,933,491	$2,395,243	$4,179,406	$18,615,768
- annuity equivalent ($/yr)	$20,212	$207,017	$187,264	$178,464	$189,369	$154,622	$269,797	$1,206,745
NPV of Capital Investment Costs ($)	$349,031	$3,585,300	$3,296,000	$2,996,000	$3,154,200	$2,495,000	$4,509,819	$20,385,350
- annuity equivalent ($/yr)	$29,982	$231,445	$212,770	$193,404	$203,616	$161,062	$291,127	$1,323,406
NPV of All Water Savings (ac-ft)	12,561	196,105	153,971	93,078	54,610	13,215	173,660	697,199
- annuity equivalent (ac-ft/yr)	895	9,129	7,167	4,333	2,542	615	8,084	32,765
NPV of Net Cost Stream per Ac-Ft of Water Savings	$18,733	$16,353	$18,841	$29,702	$53,718	$181,248	$24,067	
Cost of Saving Water ($/ac-ft) [1]	$22.58	$22.68	$26.13	$41.19	$74.49	$251.35	$33.38	$36.83

1 i.e., Annuity equivalent, assuming perpetuity, zero salvage values, and replacement with identical technology.

Table 7. Economic and Financial Summary of 8 Pipeline Project Components Analyzed by TAES/TCE.

Item	Component No. / ID Abbreviation / ID Common Name / Project Type								Aggregate (8 components)
	10 BID (Brownsville) Pipeline	11 CCID #1 (Harlingen) Pipeline	12 CCID #2 (San Benito) Pipeline	13 CCID #2 (San Benito) Pipeline	14 CCID #2 (San Benito) Pipeline	15 HCID #1 (Edinburg) Pipeline	16 HCID #1 (Edinburg) Pipeline	17 HCID #2 (San Juan) Pipeline	
Total Discount Period (years)	50	50	50	50	50	50	50	50	
Cost Discount Rate – Ag. $ (%)	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	6.1250%	
Discount Rate -- Water and Energy Volume (%)	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	4.0000%	
Cost of Water Saved									
NPV of Net Cost Stream ($)	$811,403	$936,099	$3,637,960	$2,339,578	$696,657	$863,339	$1,232,675	$1,074,075	$11,591,785
- annuity equivalent ($/yr)	$52,379	$60,429	$234,845	$151,029	$44,972	$55,732	$79,574	$69,336	$748,296
NPV of Capital Investment Costs ($)	$2,356,000	$1,397,786	$4,396,000	$2,646,000	$826,000	$1,333,299	$3,847,125	$1,580,300	$18,382,510
- annuity equivalent ($/yr)	$152,089	$90,233	$283,779	$170,810	$53,322	$86,070	$241,976	$102,015	$1,180,293
NPV of All Water Savings (ac-ft)	40,208	48,869	124,954	34,760	13,849	48,509	70,013	20,989	402,151
- annuity equivalent (ac-ft/yr)	1,872	2,275	5,817	1,618	645	2,258	3,259	977	18,720
NPV of Net Cost Stream per Ac-Ft of Water Savings	$20,180	$19,155	$29,114	$67,307	$50,302	$17,798	$17,606	$51,174	
Cost of Saving Water ($/ac-ft) [1]	$27.99	$26.56	$40.38	$93.34	$69.76	$24.68	$24.42	$70.97	$39.97

[1] i.e., Annuity equivalent, assuming perpetuity, zero salvage values, and replacement with identical technology.

Conclusions and Implications

Baseline, status-quo results, extrapolated from the 17 proposed project components previously evaluated by TAES/TCE (assuming their average costs represent what yet-to-be-determined projects/components will cost) indicate initial construction costs (to attain the 211,000 ac-ft of annual water savings estimated by Fipps in 2000) will be an estimated **$157.8 million.** As evidenced in **Tables 2** and **3**, however, the *costs-of-saving-water* across individual components can vary greatly.

In summary, the comprehensive 'net-impact' cost represented in the economic and financial results of the individual project components displayed in **Table 2** (and of other future proposed projects) should be considered by ID managers, policymakers, and other interested stakeholders if limited capital-investment funding is to be optimized. That is, some projects save water (or add to the region's supply) at what appears to be a very efficient cost, while others are more, and sometimes much more, expensive. As the LRGV region addresses the future water-supply imbalance, efforts to identify and financially support the most cost-effective projects should be a priority for all stakeholders.

Limitations and Caveats

The $157.8 million investment estimate reported herein is based on previously published estimates, using a logical extrapolation approach. This method of analysis was followed in the absence of more robust documented data being available to facilitate more detailed estimation procedures. In this section, several caveats are noted, qualifying the supposed accuracy of the $157.8 million estimate in recognition of several potential limitations in the available data.

Fipps' (2000) estimate of 211,000 ac-ft of potential delivery conveyance system water savings is broadly based, using county-level estimates of existing and potential delivery efficiencies. Notably absent are irrigation district-specific insights which identify the attributes of existing delivery system infrastructure on a smaller scale (e.g., miles and diameters of pipeline, miles and wetted perimeters of canals/laterals, number of turnouts, relift structures, soil types, etc.) and engineering-based water-savings estimate for each ID specific project type (e.g., canal/lateral linings, pipelines, etc.). The lack of such detailed data on potential water savings prohibits identification of a more accurate, and certainly more documented, estimate of needed investment for rehabilitation.

TAES/TCEs economic information is predicated on the accuracy of data collected and assimilated during the evaluation of individual project components. Among the principal factors considered for each component are the initial investment costs, the projected useful life, the changes in O&M, and the associated annual potential water savings. Limited preliminary post-installation evaluation of selected rehabilitation projects indicate the original estimated water savings may have been overstated for the scope of some proposed components. Such unanticipated underachievements of water savings may be associated with non-inclusion of additional improvements such as gate repair. If that is the case, the cost-of-saving-water could be substantially understated, as well as the estimated $157.8 million for initial required investment.

The supposition that the 17 project components previously evaluated by TAES/TCE are directly and proportionally representative of the scope of projects required to achieve the total 211,000 ac-ft of water savings estimated by Fipps (2000) could be challenged. For example, perhaps the existing proportion of lining canals versus replacing canals/laterals with pipelines in the 17 components evaluated by TAES/TCE is inconsistent with a similar proportion for the total valley-wide scope of rehabilitation. Further, perhaps some types of rehabilitation (e.g., gate structures) are not represented in the TAES/TCE information set, thereby potentially skewing the estimation procedure. Presuming there are 554,938 acres of irrigated agriculture in the LRGV (Texas Water Development Board) and that on average each 40 acres requires a gate structure costing $500 - $1,000. Therefore, another $7 - 14 million (i.e., 554,938 acres divided by 40 acres/gate equals 13,874 gates; multiplying by this value by $500 and $1,000 results in estimates of $7 - $14 million, respectively) of required rehabilitation investment would not be represented in the extrapolated $157.8 million estimate.

As a final review of the estimated investment, one other method of extrapolation is presented. A review of **Table 2** indicates and reports 53,602 ac-ft of annuity equivalent water savings for the 17 components which encompass rehabilitative efforts to improve 81.56 miles of waterway infrastructure. Given an estimated total 3,200 miles of pipelines, canals, and laterals in the LRGV ID system (Fipps; Rister et al. 2004), the implication is that rehabilitating 2.55% (i.e., 81.56 ÷ 3,200 = .0255) of the region's irrigation waterways will produce 25.4% of the potential savings estimated by Fipps (i.e., 53,602 ÷ 211,000 = .254). Although it is expected that early rehabilitation projects would be directed to the worst areas, intuitively, a comparison of these two proportions suggests they may be misaligned with one another. That is, fixing 2.55% of the waterways and realizing 25.4% of the potential water savings does seem somewhat extraordinary, and does provide cause for review. Though inconclusive, we can think of three plausible explanations for these results:

> Authors' Note:
>
> We apologize for the possibly confusing counter arguments provided in the indented and italicized text below, but we do wish to provide the reader an unabridged report which provides some amount of discussion about the inexactness of our providing a single dollar estimate of what the needed investment costs might be, since the data input is inexact by its very nature. That is, estimating construction costs, changes in operations and maintenance costs, how long will a project save water, how much water each year, etc. are all individually (and collectively) inexact. That is why we call the single dollar estimate an "estimate."

1) The input data are accurate. The 17 proposed project components (used in extrapolating a value for the total investment required) fix some very inefficient segments of the waterway system, and rehabilitating a small portion of the system does result in large water savings.

   If this is the case, the $157.8 million estimate could be low if future projects are not as effective at saving water, relatively speaking. Conversely, if future projects are more effective at saving water, then the estimate would be high - - given our assumption that ID managers (and their consulting engineers) would propose to fix their worst problems first, we would give little credence to this sub-argument, i.e., if the estimate is high. Given that only 2.55% of the waterway infrastructure is being impacted with the proposed components analyzed, however, the argument would tend to lean towards the $157.8 million estimate being reasonably accurate since there are many waterway segments which need to be fixed.

2) The estimated water savings used in analyzing individual project components are, across the board, excessively high, and are therefore the source of the potential inconsistency in comparing the 2.55% infrastructure fix versus the 25.4% of potential savings.

   Under this scenario, the $157.8 million value is probably low as the "actual" cost-effectiveness for future projects would be, albeit more accurate, less than the overstated water savings of projects used in making the extrapolated estimate.

3) The total potential savings estimate of 211,000 ac-ft by Fipps is an underestimate.

   If this is the case, please note there are no intentions to disparage any work done by Dr. Fipps, but only to reiterate comments about data input often being inexact in nature. If additional potential savings are identified in Fipps' 2005 work, the $157.8 million required investment estimate value is likely too low.

Future Opportunities and Needs

Based on available information related to costs of rehabilitation and water savings, an extrapolation of selected project components for the LRGV was conducted. Significant confidence in such estimates would be achieved through defining and quantifying the miles of canals where alternative projects (i.e., lining, pipeline, etc.) would be appropriate. Any refinement in size of sections to be rehabilitated further improves the estimate of total required investment costs.

In addition, accountability is especially important to agencies such as the USBR and TWDB. Therefore, selected seepage (losses) estimates both before and after construction and implementation of a rehabilitative project work to verify the anticipated water savings in the original project proposals.

In the work done and ongoing related to economics, the methodology to bring more detailed information has been incorporated into a spreadsheet as shown in **Tables 4-7**. Application of these spreadsheets with refined values on an option-specific basis is an effective process for more accurate values of total investment for rehabilitation as well as the cost per acre foot of water saved. Such refinement is recommended following completion of Fipps' 2005 work.

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Endnotes

1. In 2000, Fipps constructed a partial budget for a $2.1M hypothetical project assumed to contribute to improving the average ID efficiency from 71% to 90%. Considerations for the expected life of the project, its annual water savings, time value of money, changes in operations and maintenance costs, and other life-cycle cost attributes were not included, however. Appropriate methodology for accounting for these conditions and arriving at a comprehensive life-cycle cost of saving water via rehabilitation is documented in Rister et al. 2002.

2. Fipps is currently updating and enhancing his original estimates, with the preliminary-revised numbers anticipated to be published in late March, 2005 and final estimates by June, 2005.

3. Fipps also estimated potential on-farm water savings under scenarios of 'with' and 'without' improvements, and across differing water-supply conditions (i.e., drought and normal). The on-farm savings are not replicated or used in this report; instead, only the estimated savings from the water-delivery conveyance system under normal water-supply conditions are utilized.

4. Fipps defined a 'normal' year as the summed total of all individual irrigation districts' highest 5-years' (i.e., non-consecutive) average diversions for the twelve-year period 1986-1998.

5. Rister et al. 2004 is an example application of this methodology with respect to Hidalgo County Irrigation District No. 2 (San Juan)'s Alamo Main capital rehabilitation project. This report also has an current listing of related reports and applications of RGIDECON©.

6. Project costing is defined here as multiplying the expected quantities of all needed resources (e.g., pipe, gates, excavation work, etc.) by their expected costs, and then summing the sub-totals, as is typically done by engineers as part of design and project-planning work.

7. As mentioned, the analyses used as a basis for extrapolating the investment estimated herein were facilitated by RGIDECON©, a spreadsheet model with data input and calculations based on economic and financial principles consistent with *capital budgeting* (Rister et al. 2002).

8. The 17 project components are grouped by project type, with the individual and aggregate life-cycle costs-of-saving-water ($/ac-ft) also provided. Further, the data/results reflect those projects previously analyzed by TAES/TCE economists, and do not include other projects proposed to the USBR.

9. Note the analysis on Cameron County Irrigation District No. 2 (aka San Benito)'s Rio Grande pumping facility is ignored herein because of uniqueness and its being non-representative of the type of conveyance system improvements captured in Fipps' (2000) estimate.

10. Refer to Rister et al. 2002 for further discussion on annuity equivalents and their application towards the economic and financial costs of water conservation via capital-project rehabilitation.

APPENDIX E

INITIALLY PREPARED PLAN COMMENTS

TWDB Comments and Responses
Public Comments and Responses

September 28, 2005

Mr. Glenn Jarvis
Chairman, Rio Grande Regional Water Planning Group
Law Offices of Glenn Jarvis
InterNational Bank
1801 So. 2nd St., Suite 550
McAllen, TX 78503

Mr. Kenneth N. Jones
Executive Director, Lower Rio Grande Valley Development Council
(Contractor)
311 North 15th Street
McAllen, TX 78501-4705

Re: Texas Water Development Board Comments for the Rio Grande Regional Water Planning Group (Region M) Initially Prepared Plan, Contract No. 2002-483-461

Gentlemen:

Texas Water Development Board (TWDB) staff completed a review of the Initially Prepared Plan (IPP) submitted May 31, 2005 on behalf of the Rio Grande Regional Water Planning Group. The attached comments follow a format similar to those used in developing the prior regional plans, including:

- Level 1: Comments and questions that must be satisfactorily addressed in order to meet statutory, agency rule, or contract requirements; and
- Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional plan.

In addition, the TWDB reserves the right to submit additional Level 1 comments as missing or incomplete materials become available. Comments will be provided after review of the online database (DB07) is complete. Also, the TWDB's statutory requirement for review of potential interregional conflict will not be completed until all applicable data and information has been provided by any potentially affected planning group. TWDB's streamflow assessment, based on full implementation of the region's IPP, will be provided under separate cover.

Title 31, Texas Administrative Code (TAC) §357.11(b) requires the regional water planning group to consider timely agency and public comment. Section 357.10(a)(3) of the TAC requires the final adopted plan include summaries of all timely written and oral comments received, along with a response explaining any resulting revisions or why changes are not warranted.

If you have questions please contact Robert Flores at (512) 463-8061.

Sincerely,

William F. Mullican III
Deputy Executive Administrator
Office of Planning

Attachment: IPP Comments
c w/att.: Mr. Joseph W. Norris, P.E. and Principal, NRS Consulting Engineers

Attachment

Rio Grande Regional Water Plan – Region M

LEVEL 1. Comments and questions *must be satisfactorily addressed* in order to meet statutory, agency rule, and/or contract requirements.

Executive Summary

1. An Executive Summary documenting key findings and recommendations of the planning group is required. None is provided. [*Title 31, Texas Administrative Code (TAC) §357.10(a)(2)*] The Texas Water Development Board (TWDB) reserves the right to make additional comments for appropriate consideration and responses. Before providing the missing unit, please review its particular requirements and limitations and follow any appropriate guidelines contained in Exhibit "B" of the contract between the TWDB and the Lower Rio Grande Development Council (the contractor). Also, please provide a copy of the Spanish version as agreed. [*Contract Exhibit "A," Supplemental Task Funding, page 24*]

Chapter 1: Planning Area Description

2. The planning group must determine and identify major demand centers by water use category. [*Title 31, TAC §357.7(a)(1)(E)*]
3. Please provide information on the plan's impact to navigation. [*Title 31, TAC §357.5(e)(8)*]
4. Describe wholesale water providers. [*Title 31, TAC §357.7(a)(1)(A)*] These providers are defined and their data discussed in Section 5 of the contract's Exhibit "B."
5. Describe the area's current water use by category (municipal, irrigation, manufacturing, livestock, steam-electric power generation, and mining). [*Title 31, TAC §357.7(a)(1)(B)*]

Chapter 3: Water Supply Analysis

6. Document all sources and their availability. [*Contract, Exhibit "B," Section 3.1*]
   - IPP Section 3.5 (pages 56 and 57) present discussion and data (Tables 3.9 and 3.10) on the Carrizo-Wilcox and Gulf Coast aquifers. Their total availability numbers conflict with entries in TWDB's database. Please clarify.
   - Also, the database identifies 50,000 acre-feet of availability from "Other" aquifers. There is no discussion of these other aquifers as a source in Chapter 3.
7. Identify and quantify water sources by county and basin. [*Contract Exhibit "B," Section 3.1.1*]
8. Aggregate water sales contracts and other information for Wholesale Water Providers. [*Contract Exhibit "C," Supplemental Task Funding, page 9*] Wholesale Water Providers are discussed in the contract. [*Contract Exhibit "B," Sections 5.1 through 5.3*]
9. Quantify the amount of additional water needed to account for the uptake and blockage caused by the aquatic weed situation. [*Contract Exhibit "C," Supplemental Task Funding, page 9*]

10. Determine and identify the new number of water user groups with projected needs after accounting for push-water. It is acknowledged some irrigation districts charge user groups four acre-feet for every one acre-foot of delivered water to account for this. Please provide the number of water user groups with additional needs after factoring push-water. [*Contract Exhibit "C," Supplemental Task Funding, page 10*]

11. Establish the additional cost of delivered water to municipal users without irrigation push-water. [*Contract Exhibit "C," Supplemental Task Funding, page 12*] Although such costs may be extrapolated, there is no discussion or summary of what they might be.

12. The impact from increased demand on alternative sources is not addressed in the IPP. [*Contract Exhibit "C," Supplemental Task Funding, page 12*]

13. Determine and identify the number of additional water user groups due to irrigation districts holding water rights of municipal users. [*Contract Exhibit "A," Supplemental Task Funding, page 15*]

14. Appendix C's municipal water supply and demand analysis for the City of Brownsville improperly identifies the firm yield of the Brownsville Weir and Reservoir Project as 40,000 acre-feet per year. That is the permitted diversion. Please correct this to reflect a firm yield of 20,643 acre-feet per year as discussed in Section 4.5.7 of the IPP. [*Contract, Exhibit "B," Section 3.1*]

<u>Chapter 4: Identification, Evaluation, and Selection of Water Management Strategies Based on Needs</u>

15. Quantitatively report the *quantity, reliability, and cost* of water delivered and treated in the development and equitable comparison of all water management strategies. [*Title 31, TAC §357.7(a)(8)(A)(i)*] There appears to be confusion and contradictory positions related to this requirement as follows:

    - Sections 4.5.2.2 and 4.5.2.3 present the quantity and cost associated with non-potable reuse. Verify the accuracy and clarify how the costs are related to the amounts presented. The 2010 annual costs for the total projected reuse amounts range between $49,000 and $90,000 and are extrapolated from other references. Is this range for the entire planning area? Table 4.22 suggests over 38,000 acre-feet of total projected reuse for the area. Is this correct?

    - An equitable comparison among strategies is unobtainable without determining the quantity and cost of advanced conservation. The IPP lists 12 percent savings and recommends advanced conservation as a strategy for meeting municipal demand. Appendix C, Decision Documents, summarizes and tabulates information for water supply and demand analysis for each water user group. For municipalities, this strategy is shown supplying 12 percent of future demand but individual municipal breakdowns show "0" yield in all decades. Please include the identified savings from advanced conservation in the Decision Documents.

16. Strategies must be presented in sufficient detail to allow agencies to make financial or regulatory decisions. [*Title 31, TAC §357.7(a)(9) and §358.3(b)(17)*] Detailed requirements (including time periods, interest rates, power costs and other supporting costs) are discussed in the contract. [*Contract Exhibit "B," Sections 1.2.5 and 4.2.9*] The IPP should present:

- . Decadal construction periods. Neither Chapter 4 nor Appendix D's unit "Water Management Strategies Cost Analysis (Sub-appendices B through N) provides such a breakout.
- Interest costs. In some cases interest during construction are not shown.
- Power costs for each strategy. Other than Sub-appendix L, dealing with costing for groundwater supplies as a recommended strategy, there are none.
- Supporting cost analysis. Appendix D and its sub-appendices are not clear on whether they are properly based on 2002 U.S. Dollars (Engineering New Record Construction Cost Index). It appears many costs are quotes from other sources and have not been updated.
- Supporting cost analysis. Section 4.5.6 recommends brackish groundwater desalination, but its cost analysis does not appear to include the cost of brine disposal. Such a factor may add significant amounts to the final cost and should properly be considered for an equitable comparison of strategies.

17. Analyze and compare all potentially feasible strategies in an equitable and consistent manner. [*Title 31, TAC §357.5(e)(4) and §357.7(a)(8)(E)*] Not all comparisons have the same level of analysis. Section 4.6, titled "Water Management Strategies Not Re-evaluated from the Previous Plan" does not compare costs using updated second quarter 2002 price levels.
18. Strategies developed for wholesale water providers need to be categorized by use and river basin. [*Title 31, TAC §357.7(a)(5)(B)*] No information can be found in the IPP summarizing needs and strategies for wholesale water providers.
19. Total costs must be discounted and shown in terms of present value so that government lending agencies can make appropriate determinations regarding the implementation of water infrastructure projects. [*Contract Exhibit "B," Section 4.2.9*] Please verify this process was applied to all strategies.
20. For all strategies, quantitatively report the impact to environmental factors, including effects on environmental water needs, wildlife habitat, and cultural resources. [*Title 31, TAC §357.7(a)(8)(A)(ii)*] There is no quantitative analysis of such impacts to support many of the potentially feasible water management strategies. For example, the primary recommended strategy is the acquisition of Rio Grande water rights (IPP Section 4.5.1.4 on page 4-28). It identifies a reduction in irrigable lands resulting in reduced flows to irrigation ditches that provide habitat for fish and drinking water for wildlife, but notes this will be offset with increased wastewater flows. There is no supporting analysis quantifying the impact.
21. Strategies need to be adjusted to provide appropriate environmental water needs. [*Title 31, TAC §357.5(e)(1)*] Evaluations should use environmental information resulting from existing site-specific studies or state environmental planning criteria adopted by the board for inclusion in the state water plan. [*Contract Exhibit "B", Section 4.2.8*] TWDB staff is aware of additional water availability modeling runs the planning group is undertaking for this purpose; however, the IPP does not currently reflect any strategy adjustments for environmental water needs.

Chapter 6: Consolidated Water Conservation and Drought Management Recommendations of the Regional Water Plan

22. A model water conservation plan needs to be included and conservation practices and drought measures considered. [*Title 31, TAC §§§357.7(c), 357.7(a)(7)(A)(i) and 357.7(a)(7)(B)*]

    - The Table of Contents for Chapter 6 (page 6-i) and Section 6.2.1 both refer to and discuss Attachment 6-5, McAllen's Water Conservation & Drought Contingency Plan. The attachment was not submitted. Please provide it. Staff understands the document identifies trigger measures applicable to the entire region, and thus may serve to meet other rule requirements.

    - Section 6.4 states Attachments 6-1 and 6-3 are identified as model water conservation plans for a retail utility. That is incorrect. The attachments contain model drought contingency plans for retail utilities. While the drought plans do contain conservation measures in a drought response, these plans are not model water conservation plans. Please supplement the attachments with appropriate plans.

23. A model water conservation plan is required for each user group to which §11.1271 of the Texas Water Code, dealing with water right permits, applies. Please include plans for *both municipal and agricultural (irrigation)* users. [*Title 31, TAC §357.7(a)(7)(A)(i)*]

Chapter 10: Adoption of Plan

24. The TWDB will approve the plan only after it considers information from planning groups of the existence of an interregional conflict and finds that no interregional conflict exists. [*Title 31, TAC §357.14(3)*] There are no statements regarding interregional conflict in either the IPP or in the letter submitting the IPP for comment. The planning group needs to address this deficiency in the adopted plan.

Overall Requirements

25. The contractor must correctly populate the required database fields. [*Contract Exhibit "B," Sections 3.1, 3.2, 4 and 5*] TWDB staff provided training on its use and data-entry. At the time of this writing, that effort is not yet complete. Consequently the TWDB reserves the right to issue additional comments that must be addressed once that particular task is finished. As previously noted, additional review time could result in a delay in TWDB consideration of the plan for approval.

26. Planning groups must evaluate all potentially feasible water management strategies, including certain specifically identified strategies covering expanded use of existing systems or the development of new supplies. [*Title 31, TAC §§357.7(a)(7)(D) and (E)*] Many of the strategies listed in these rules may not be practical in this particular region; however, clear statements explaining why a strategy should not be considered and/or analyzed should be included.

LEVEL 2. Comments and suggestions that *might be considered* to clarify or help enhance the plan.

Executive Summary

27. The public may benefit by providing a matrix table summarizing all potential and recommended water management strategies, perhaps cross indexed by water use category.

28. The plan might disclaim project impacts by noting regional planning is a reconnaissance level effort, and a detailed investigation of impacts is beyond its scope and mandate. Impacts and cost-benefit analysis may undergo additional and extensive scrutiny during permitting under Section 404 of the Clean Water Act, the National Environmental Protection Act and any other applicable state or local regulations. Additionally, in this particular planning area, international issues may further impact a specific project.

29. The public may benefit from a summary table covering supply sources, availability, and yields in one location.

Chapter 1

30. Section 1.4 of the IPP fails to discuss the Yegua Jackson aquifer as a potential source of groundwater for the planning area. Consider a brief description similar to IPP Section 3.5.3.2.

Chapter 3

31. The public may benefit from a breakout and discussion of "other" aquifers identified in the electronic database and for which there is no discussion on their characteristics nor maps of their occurrence.

32. The continuation of Table 3.13, titled "Summary of Total Amounts of Currently Available Water Supplies for the RGWPR by Water Use Category and by Source Supply" (on page 3-73) is mislabeled. It indicates Table 3.12. Both its relative setting and the chapter's table of contents indicate it is properly Table 3.13.

Chapter 4

33. Section 4.5.4 dealing with advanced water conservation as a recommended water management strategy appears confusing and contradictory. Text states mandatory plumbing conservation measures are not considered "additional advanced measures" (Section 4.5.4.1). The next Section (4.5.4.2) states no water user groups expressed interest in pursuing such measures and "Therefore……included the TWDB plumbing conservation figures in the water supply yield" (referring to Table 4.27). Please clarify.

34. Section 4.5.4.3 attempts to discuss the cost associated with advanced water conservation, but costs are not presented here. Consider presenting the costs, or referencing those identified in Appendix D, Technical Memorandums, and associated with the section titled "Water Management Strategy Cost Analysis."

35. Section 4.5.7, recommending the Brownsville Weir and Reservoir Project as a strategy, might benefit form a discussion regarding potential involvement and buy-in from the Federal Republic of Mexico.

36. Section 4.5.7.3 and Appendix D, sub-appendix F present apparently confusing cost analysis for the Brownsville Weir and Reservoir Project. The Section discusses $13.6 million in annual operating and maintenance costs while the appendix refers to $10,394,441.05 and $11,990,869.90. How do these figures relate?

37. Table 4.38 (on page 4-58) refers to sub-appendix K of Appendix D. The sub-appendix being referred to is L, not K, and "analysis" should be spelled "analysis."

38. Page 4-1's chapter title contains a misspelled term. "EVALAUTION" should be spelled "EVALUATION."

39. Many of the recommended strategies do not reflect the application of consensus environmental criteria. The IPP might benefit from a clear discussion as to why such criteria are not applicable.

40. Given the region's efforts to initiate water banking on a regional level, as an approach to encourage the voluntary transfers of water, a summary of how the local water bank operates may be beneficial. It could fit under IPP Section 4.5.1 dealing with the acquisition of water rights or in a general discussion of water rights in Chapter 3.

Overall Suggestions

41. Consider reordering and indexing the appendices. Many have multiple "sub" appendices that are stand alone documents but nevertheless are titled as appendices themselves. This is confusing. Another solution might be to move minor documents to the appropriate individual chapters and categorize them as attachments (this is done in with other documents already). Either way, please consider placing appropriate references throughout the chapters so that readers can access details presented in the appendices.

42. Attachments listed in the various tables of contents for each chapter might be labeled with the content's title.

Responses to TWDB Comments

Level 1 Comments

1. An Executive Summary is included in the Final Draft. A Spanish version of the Executive Summary is also included.
2. Major demand centers were identified and added to Chapter One in the Final Draft. (Section 1.7)
3. A statement was added to the final plan in Chapter One stating that there were no major impacts to navigation caused from the implementation of the plan. (Section 1.3)
4. A section addressing the wholesale water providers was added to the final plan in Chapter One. It includes a table listing the WWPs for the region. (Section 1.7)
5. The Region's current water use was added to Chapter One. (Section 1.2.2)
6. The information contained in the database has been clarified.
7. Text was added to section 3.6.3 referencing the reader to Appendix C.
8. Supplemental text will be provided detailing WWP sales contracts and other information.
9. Supplemental text will be provided detailing the aquatic weed situation. Information will be obtained from the Rio Grande Watermaster to quantify the amount of additional water typically released to overcome the aquatic weeds when they are prevalent in the Rio Grande below Falcon Dam. This quantity will be related to typical releases during different times of the year.
10. Supplemental text will be provided detailing the push water study. The new number of WUGs with projected needs after accounting for push water will be determined and identified. It will be assumed that the push water requirement will consist of the additional water released from Falcon Reservoir to offset losses associated with the delivery of municipal water in the absence of irrigation demands plus the quantities of water required to charge the irrigation district canals to facilitate the municipal water deliveries in the absence of irrigation demands. The push water requirement will be distributed proportionally among the municipal users that rely on the irrigation districts for their deliveries.
11. Supplemental text will be provided detailing the push water study. Push water volume data from Item 10 above will be used to develop a general cost estimate for push water based on the typical cost per acre-foot of annual spot sales of water by irrigation districts.
12. The impact from increased demand on alternative sources is not anticipated to be significant since the push water for municipal deliveries within the irrigation districts will come from additional releases from Falcon Reservoir. No alternative sources of water will be needed.
13. Table 3.15b was added to describe irrigation districts holding municipal rights.
14. Brownsville Weir Yield was corrected to reflect a firm yield of 20.643 AF/yr.
15. Cost Analysis for the strategies in question were clarified. Reuse figures were modified. Advanced Water Conservation as a WMS was revised to clarify the cost analysis and water yield. (Sections 4.5.2.3 and 4.5.4)

16. Decadal construction periods were added in Appendix D's unit "Water Management Strategies Cost Analysis" (Sub-appendices B through N). Interest costs were clarified in Appendix D's unit "Water Management Strategies Cost Analysis" (Sub-appendices B through N). In Appendix D's unit "Water Management Strategies Cost Analysis", power costs for all WMSs are included as Operation and Maintenance Costs. All costs were calculated using 2002 U.S. Dollars. Brine disposal is site specific, and in this region, surface disposal is the applicable option. Brine disposal consists of permit costs, piping to discharge canal costs, fallout costs, and various other construction related costs. These costs were added to the construction costs of the desalination plant. An additional table and explanation that includes brine disposal was added to Appendix D's unit "Water Management Strategies Cost Analysis".
17. "Water Management Strategies Non Re-evaluated from the Previous Plan" were a part of the last round of regional planning, but they were not evaluated for this round. The associated costs were not recalculated due to the fact that no new data was researched and provided to reevaluate them. The text for each strategy in Section 4.7 was taken directly from the previous plan. The only costs in the technical report were those strategies recommended in this round of regional planning. However, the text in Section 4.8 was readjusted to reflect the following:
    a. Groundwater Supply Alternatives for the City of Laredo: The updated cost would be the same as the groundwater costs found in Appendix D. The cost for groundwater is $304.46, which includes the treatment of water. Groundwater development is site specific so a range of $580 to $1,000 per acre-foot is reasonable still at present cost.
    b. Gulf Coast Aquifer: This strategy is being implemented with the construction of Southmost Regional Water Authority's Brackish Desalination Plant located in Cameron County. The cost is estimated to be $505.51/AF taking into consideration power costs, reatment costs, and interest accrued during construction.
    c. Additional Water Supply Reservoirs on the Rio Grande: There were no costs evaluated in the last plan. Therefore, reevaluation could not take place.
    d. Capture and Use of Local Runoff in the LRGV: There were no costs evaluated in the last plan. Therefore, reevaluation could not take place.
    e. Reallocation of Storage in the Amistad-Falcon Reservoir System: There were no costs evaluated in the last plan. Therefore, reevaluation could not take place.
    f. Conveyance of Rio Grande Water Supply – Gravity Canal: In 1952 the Gravity Canal Project was projected to cost approximately $18.32 million, with annual operation and maintenance costs of approximately $154,000. When these cost estimates are adjusted to current (1999) conditions, the Gravity Canal Project would cost over $193 million, with annual operation and maintenance costs of over $1.6 million. However, it should be noted that the original cost estimates likely do not account for such factors as permitting and mitigation of environmental impacts. The Gravity Canal

Project would cost over $210 million when adjusted to current (2005) conditions.

g. Conveyance of Rio Grande Water Supply – Pipeline from Falcon Reservoir to the LRGV: The previous evaluation of the feasibility of the water transmission pipeline was preliminary with several alternatives considered. These alternatives include three identified pipeline routes, delivery of treated or raw water, system size, and four delivery points. The cost information presented in this section focuses on the costs for the system to deliver 100 millions of gallons of treated water per day from Falcon Reservoir to Hidalgo and Starr Counties. The annualized cost to construct the entire project is estimated to be approximately $24 million dollars. When compared to the maximum net water savings at full utilization of the project, the annualized unit cost per acre-foot of recovered municipal water supply is $1,025. The cost to deliver the total amount of treated water approximates $275 per acre foot.

h. Importation of Surface Water: Cost estimates for the three surface water importation options are as follows.

	Lavaca Basin to Laredo	Nueces Basin to Laredo	Nueces Basin to LRGV
Supply	22,403	22,403	19,042
Unit Cost ($/ac-ft/yr)	$1,610	$1,030	$600

18. A table listing WWPs by use and river basin was added to Chapter Four (Table 4.3). Corresponding needs and Water Management Strategies were also listed. (Section 4.6)
19. An explanation of how the costs were derived was added in Appendix D's "Water Management Strategies Cost Analysis" (Sub-appendices B though N).
20. A Quantitative Environmental Analysis was added as Section 4.7 in the text.
21. Environmental impacts were evaluated quantitatively in Section 4.7. In addition, Chapter 7 includes a report detailing the effect of WMSs on stream inflows. The result of this study was that there are no significant impacts to freshwater inflows with the given allocation of WMS yields. Therefore, there is no need to adjust the WMSs based on environmental water needs. It should be noted that environmental flows were accounted for during selection of WMSs to meet water deficits.
22. McAllen's Water Conservation and Drought Contingency Plan is included in the final draft. Attachments 6-1 and 6-3 were revised to make them Drought Contingency Plans. Model Water Conservation Plans were also added.
23. Plans for both municipal and agricultural (irrigation) users is included as attachments to Chapter 6 in the final plan.
24. The potential for interregional conflicts was researched. No such conflict was found. Text stating this was added in Section 10.3.
25. Database entry was completed. The Regional Planning Group is currently awaiting official database comments.
26. A table addressing why some water management strategies were not included in this plan was added in Section 4.3.1.

Level 2 Comments

27. A matrix table was not included in the final plan.
28. Verbiage was included regarding the reconnaissance level effort of this plan. International issues were also discussed.
29. A source summary table was not included in the plan.
30. The Yegua Jackson aquifer was included.
31. "Other" aquifers will be researched, and more information will be inserted in the next round of regional planning.
32. The table is correctly labeled Table 3.13.
33. Advanced Water Conservation was revised.
34. Advanced Water Conservation costs were revised and clarified.
35. Mexico's involvement in the Brownsville Weir was included in Section 4.5.7.5.
36. Brownsville Weir cost description was revised for clarity.
37. Typos were corrected.
38. Typo was corrected.
39. A quantitative environmental analysis was included (Section , as was a fresh water inflow study.
40. Discussion concerning the water bank is included in Chapter 7. An expanded analysis of the water bank should be incorporated into the next round of regional planning.
41. Appendices and attachments were reordered.
42. Attachments listed in the various tables of contents were labeled with the content's title.

PUBLIC COMMENTS

RECEIVED MAY 2 3 2005

TEXAS PARKS & WILDLIFE

May 12, 2005

RECEIVED
MAY 2 3 2005
NRS SUBMITTAL LOG NO. 1

Mr. Glenn Jarvis
Law Offices of Glenn Jarvis, InterNational Bank
1801 South Second Street
Suite 550
McAllen, Texas 78503

Dear Regional Water Planning Group Chair:

In a letter dated May 5, 2004 Texas Parks and Wildlife Department (TPWD) provided your planning region with TPWD's perspective regarding quantitative environmental impact analysis of water management strategies required by the Regional Water Planning Groups according to Texas Water Development Board (TWDB) Rule 31 Texas Administrative Code §357.7(a)(8)(A). At that time, we provided information TPWD developed on the expected impacts associated with different water management strategies to you and the planning group consultants. We also offered to further assist TWDB and the planning groups on the development of priority environmental criteria. Since that time, we have met with consultants from each region and made presentations to planning group members upon invitation from the regional planning groups.

Because TPWD is charged with management of the state's fish and wildlife resources, a main focus of our review and comments on draft regional water plans will be the environmental impact of various water management strategies. The quantitative analysis required by the TWDB rules will be an important source of input to the staff's review process. I am aware of the considerable constraints that many planning regions face in meeting this requirement. I hope that TPWD's nonvoting representative in your region has been helpful and you have made full use of them as a resource. It is those individuals who will provide us with significant input to the agency's review. It would be my goal that you are fully aware of any concerns or issues that might arise as that review progresses. Please make use of our representatives to accomplish that end.

We continue to offer support to planning groups as they evaluate the environmental impacts of proposed water projects. Additionally, we stand by our offer to coordinate with TWDB on an approach that would support the statutory requirement to quantify the environmental impacts of water

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512-389-4800

www.tpwd.state.tx.us

COMMENT NO.1

management strategies in regional and state planning. The imperative remains that we plan for safe, dependable water supplies for Texans at the same time that we protect the state's natural resources.

Should you have any additional comments or questions regarding TPWD's role, please do not hesitate to contact me.

Sincerely,

Larry D. McKinney, Ph.D., Director
Coastal Fisheries Division

cc: RWPG Chairs
RWPG Consultants

LDM:CL:ms

May 26, 2005

To: Bill Norris - NRS Engineers fax - 423-7482
From: James R. Matz – Water Plan Member
Subject: Region M Water Plan

Dear Mr. Norris

1. Water Plan – Population and Water Demand for Palm Valley - Please correct the Region M Water Plan so that data shown for population and water demand for Palm Valley is more accurate.

As you may be aware Palm Valley is basically a retirement community and home of the Harlingen Country Club. For the last many years, Palm Valley has been surrounded by either Harlingen's city limits or ETJ. In other words, it is impossible for Palm Valley to increase its physical size. Likewise, Palm Valley is essentially totally "built out" with only five undeveloped residential lots and about 10 lots available for commercial use.

According to the 2000 Census, Palm Valley's population was 1298. Given new residential construction since then and the future development of the five residential lots, Palm Valley's population will probably never exceed 1325 and the demand for water should "max-out" proportionately.

2. Abolition of Palm Valley Estates Utility District - On April 25, 2005, the Palm Valley City Council abolished the Utility District and merged utility activities into the City (see attached notice). Therefore, please eliminate from the plan all references to the Palm Valley Estates Utility District.

3. Drought Contingency Plan - For your information Palm Valley now has a drought contingency plan.

4. Water Usage – See attached memo from Wayne Halbert. Palm Valley has 312.5 acre ft. or 101,828,437.5 gallons of water rights. In 2004, Palm Valley used 25,751,362 gallons or 39.5 acre ft. of Harlingen Irrigation District Water. Please note that in 2000 and 2001 usage of District water exceed 50 million gallons or twice the 2004 usage.

We would appreciate it if you would modify the data for Palm Valley in the plan accordingly. Please do not hesitate to call me (423-8030) if you have any questions.

Regards,

James

Cc: Palm Valley City Council

PS - Pls confirm receipt (423-8030)

RECEIVED
MAY 26 2005
NRS SUBMITTAL LOG
NO. 2

COMMENT NO.2

HARLINGEN IRRIGATION DISTRICT
P.O. Box 148 - Harlingen, Texas 78551
956-423-7015 FAX 956-423-4671
waynehalbert@hidcc1.org

May 19, 2005

Joe,

Here is a copy of the contract between the District and Palm Valley. In review of the contract it is clear that we are not treating Palm Valley like the contract states. This contract is a "take or pay" contract, which means we should be billing you for the 80% of the 88,000,000 until you are using that much water and then charge you for whatever you use above the 80%.

Palm Valley has 312.5 acre feet or 101,828,437.5 gallons of their own water. The 88,000,000 gallons is the overage out of the District account to meet Palm Valley's deficit water needs. The following figures give you a history of Palm Valley's usage over the past 5 years.

Year	Gal. Used		PV H2O		District H2O
2004	127,590,000	-	101,828,437.5	=	25,751,562
2003	129,521,000	-	101,828,437.5	=	27,692,562
2002	144,514,000	-	101,828,437.5	=	42,685,562
2001	154,635,000	-	101,828,437.5	=	52,806,562
2000	153,144,000	-	101,828,437.5	=	51,315,562

At 80% of the 88,000,000 gallons, Palm Valley should have been paying us for a minimum of 70,400,000 gallons a year. Instead we have only billed you for the actual overage as shown in the above figures for the past 5 years. This is not a great deal of money but would mean that Palm Valley should have been paying us at the rate of a minimum of $6,758 per year or $563 per month.

The District delivers all water to the City of Harlingen. They report to us the amount of water that they deliver to you. These are the figures we use to account for your water and the overage necessary to meet your needs. We are billing you only for the overage water. The City of Harlingen charges are for what they do for you plus the delivery fee that we charge for all water delivered from the River to Harlingen's plants.

Wayne Halbert

CITY OF PALM VALLEY

1313 Stuart Place Road, Ste 100
Palm Valley, Texas 78552
Telephone (956) 423-8384
Fax: (956) 423-6324

April 25, 2005

PUBLIC NOTICE

In December 2004, and again in February 2005, water samples taken by Palm Valley Estates Utility District, an organization completely separate from the City of Palm Valley and owned by Palm Valley Property Owners, tested positive for E.coli and fecal coliform. As a result, the Palm Valley Estates Utility District was required by the Texas Commission on Environmental Quality (TCEQ), in accordance with state statue #30 TAC 290.46(q)(1), to issue "Boil Water" notices. Although this was done, it did not conform with the format and procedures required by TCEQ. TCEQ found the Palm Valley Estates Utility District in violation of legal requirements.

Given the potential threat to public health of residents, employees, customers of Palm Valley businesses and in response to citizens interest in combining the Utility District with the City, the Palm Valley City Council voted unanimously on April 20, 2005 to adopt Ordinance 2005-3 which authorizes the City of Palm Valley to merge the Palm Valley Estates Utility District into the City of Palm Valley. The Council then, on April 25, 2005, following State Statue Local Government Code 43.075 unanimously voted to make the merger effective upon passage of Ordinance 2005-4 on that date. Therefore, at that date and time all assets, liabilities and responsibilities for the operation of the water and wastewater treatment systems was vested to the City and the Palm Valley Estates Utility District was dissolved.

Until the City Council makes a final decision on exactly how the water and wastewater systems will be organized for the long run, the City has entered into an agreement with the Harlingen Waterworks System to provide operational support.

Residents of Palm Valley can be assured that the City Council will ensure that (1) "best practices" will be adopted for the operation of the water and wastewater systems; (2) the existing billing and property tax rates will be reviewed; (3) administrative policies and practices and the possiblity of administrative savings, especially the duties of record keeping and the handling of monies, will be reviewed and adjusted as deemed necessary.

Mayor James R. Matz

Mayor Pro-Tem Raymond Elledge

August C Hurt

Councilman Gus Hurt

Councilman Jordan Bolton

Councilwoman Darlene Topp

Councilwoman Lois Shreve

To: Bill Norris 423-7482 5/24/12
from: JRMatz
FYI.
James

CITY OF PALM VALLEY

1313 Stuart Place Road, Ste 100
Palm Valley, Texas 78552
Telephone (956) 423-8384
Fax: (956) 423-6324

April 25, 2005

PUBLIC NOTICE

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Mayor James R. Matz

Mayor Pro-Tem Raymond Elledge

Councilman Gus Hurt

Councilman Jordan Bolton

Councilwoman Darlene Topp

Councilwoman Lois Shreve

RM0201: IPP Comment

Jacob White

From: Bill Norris [bnorris@nrsengineers.com]
Sent: Tuesday, June 14, 2005 3:17 PM
To: Jake White
Subject: FW: Brownsville Weir

RECEIVED
JUN 14 2005
NRS SUBMITTAL LOG
NO. 3

--
Joseph W. (Bill) Norris, P.E.
NRS Consulting Engineers
1222 E. Tyler, Suite C
Harlingen, Texas 78550
(956) 423-7409
(956) 423-7482 FAX
(956) 535-1449 Cell

------ Forwarded Message
From: Robert Flores <Robert.Flores@twdb.state.tx.us>
Date: Tue, 14 Jun 2005 15:12:47 -0500
To: <bnorris@nrsengineers.com>, <bbrandes@rjbco.com>
Subject: Brownsville Weir

Good afternoon. Database error. Please correct.

Apparently confusion between permitted amount and firm yield. 40K entered on DB07 . The cost per ac-ft based on that amount is $537.27 which is the same cost per ac-ft listed on page 4-53 of IPP.

The cost in Appendix F (under Appendix C) show $11,090,869/20,643=$537.27) but the numbers in the database for Total Annual Costs are $128,944,800 (not $11,090,869); however, when you divide the DB07 total annual costs entered by the total supply entered (the permit amount of 40K) you get the same cost per ac-ft. If you get the same numbers per ac--ft that solves that, but all supply numbers in the database for reservoirs must be based on firm yield, not the permit amount. Why entered different annual costs than in hard copy?

------ End of Forwarded Message

COMMENT NO.3

RM0201 IPP Comment

Comments on Region M Plan
Submitted August 17, 2005
Karen Chapman, Environmental Defense
(956) 982-0220
kchapman@ed.org

RECEIVED
AUG 17 2005
WRS SUBMITTAL LOG

Thank you for the opportunity to submit comments today on this plan. I am commenting on behalf of Environmental Defense in my capacity as a water and wildlife analyst, and as a local observer in the regional water planning process.

I want to first recognize the hard work of this group and the long hours that each member has voluntary given to the water planning effort. I believe that the citizens of the region are well served by the work you all are doing. We also recognize the uncertainties of this region's water supply situation, the conflicts that have arisen over the past decade concerning water resources shared with Mexico, and how these conflicts have complicated the planning process. We commend the irrigated agriculture interests who have taken it upon themselves to implement water saving measures and do the necessary work to find funds for these measures, even as they have to bear the brunt of the drought and subsequent water shortages. We also commend the region for choosing to optimize existing water supplies and seeking to reduce municipal needs through water conservation.

I have comments on three specific aspects of the plan:
1) Advanced water conservation as it applies to municipal WUG's
2) Applying recommendations from the TPWD estuary study toward specific projects in the next round of planning e.g. the BWR.
3) Discussion on classifying environmental flows as a WUG

First, it is not clear how advanced water conservation is being defined in the plan, or whether advanced water conservation measures are being considered. Section 4.5.4.2 (Water Supply Yield), page 4-39, recommends, for WUGs with a projected shortage, a 2% reduction in demand per decade over the 50-year planning period. The section acknowledges this is also TWDB's yield for mandatory plumbing conservation, but it is not clear whether the plan intends for this to also be considered as an advanced water conservation measure. The rules state that the RWPG needs to document the reason for not adopting a water conservation strategy that exceeds minimum levels (§357 (a)(7)(A)).

In Appendix C, at the top section of most, if not all of the Water Supply and Demand Analysis sheets, a volume of water from "Advanced Water Conservation WMS" is included. However, it appears that this savings is related to mandatory plumbing conservation and not true advanced water conservation measures. On those same analysis sheets, under "Evaluation of Selected Water Management Strategies" for the strategy Advanced Water Conservation almost all WUGs are at zero. Stated another way, if the 2% reduction is embedded in the demand figures, but this is really only

COMMENT NO.4 #4

compliance with the plumbing code, true advanced water conservation measures don't appear to have been considered. The statement: "No WUGs expressed interest in pursuing additional advanced water conservation measures" seems inadequate as an explanation for why they were not considered. While the section on Implementation Issues does take some steps to explain why advanced water conservation was not given more consideration, costs to smaller distribution networks being one of the stated reasons, there is no breakdown of costs or a cost table provided that would explain this further.

For additional guidance, the Water Conservation Implementation Task Force, a body convened by the legislature and composed of user groups, came up with a guide of Best Management Practices in November 2004 for regional water planning groups that can be helpful in promoting conservation practices. The task force recommended a reduction of 1% per year gpcd for WUGs with unmet water needs using greater than 140 gpcd. As an example of an advanced water conservation measure being implemented by another RWPG, Region L (South Central Texas – including San Antonio) has incorporated this strategy - to reduce per capita consumption by 1% annually until achieving a rate of 140 gpcd – but the group goes beyond that by stating they will continue to push consumers to reduce water consumption by ¼ % annually, even after achieving the 140 gpcd level.

Second, I urge you to keep in mind that the amount of environmental flows needed to keep the Rio Grande estuary functioning in a healthy manner are still largely undefined, and that adjustments in the plan may be necessary once the TPWD completes its study of flows needed for estuarine functioning in the Rio Grande. The group is to be commended for requesting that the study be moved forward, because these figures will show what targets the group should strive for as it reviews the potential environmental impact of projects that could affect freshwater flows downstream, particularly the BWR project. This analysis, coupled with the two-step process the National Wildlife Federation has proposed for evaluating the impacts that water management strategies will have on freshwater estuary inflows, should provide the group with valuable information to use as you begin the next round of planning.

Another strategy the group has included for discussion in the next round of planning includes the concept of designating environmental flows in a unique Water User Group category. We very strongly endorse this concept and encourage you to examine this strategy carefully, as it could be the implementation key for reserving and supplying needed estuary flows as further information concerning what those flows might be is brought to the table. Such a move would mark this Regional Water Planning Group as a definite trendsetter among planning groups, providing a needed example of a means other groups might adopt as they work out how to protect and supply environmental flows in other areas. Establishing environmental flows as a WUG would also enable consideration of strategies that would impact that WUG, just as the impacts of unmet water needs on other WUGs are considered.

For example, tourism is an important economic sector in Texas and in the Lower Rio Grande Valley, as it contributes to local job growth and to the growth of the service sector industry. Surveys conducted in the late 90's of visitors to the Sabal Palm Sanctuary, Santa Ana and Laguna Atascosa National Wildlife Refuges led researchers to conclude that conservatively, these three publicly accessible places are responsible for a regional economic impact of $118 million.[1] Since current rules do not go beyond examining the impacts of water management strategies on WUGs, establishing environmental flows as a WUG would also enable consideration of the impacts of unmet water needs on nature tourism and other industries with an economic value directly related to availability of water for natural resources.

Finally, I'd like to thank the group for your endorsement of the supplemental funding request for Salt Cedar removal work submitted to the TWDB last June by Region E. The state of Texas funded this request at the $100,000 level, which leveraged an additional 300,000 from the Army Corps of Engineers. Work is proceeding on this front as the Corps and TCEQ finalize the study agreement.

Environmental Defense, in collaboration with the Sierra Club and the National Wildlife Federation, will issue more detailed comments on the Region M plan in the near future. Meanwhile I stand ready to assist the group in any way I can as you continue working toward a sustainable plan to supply future water needs in the Lower Rio Grande Valley.

---

[1] *Valuing Nature in Texas*, Mitchell Mathis and Daniel Matisoff, March 2004, Houston Advanced Research Center, http://www.harc.edu/harc/Projects/Nature/Reports/LRGCharacterization.pdf

RM0201 IPP Comment

Charlene Torres

From: Jacob White [jwhite@nrsengineers.com]
Sent: Thursday, September 01, 2005 10:11 AM
To: Charlene L. Torres
Subject: FW: Reg. M Water Plan Typo

Jacob M. White
NRS Consulting Engineers
1222 E. Tyler, Suite C
Harlingen, TX 78551
office: (956)423-7409
fax: (956)423-7482
cell: (956)535-1297

-----Original Message-----
From: Jody Gilliam [mailto:jody@fernandezgroupinc.com]
Sent: Tuesday, August 30, 2005 5:32 PM
To: Jwhite@nrsengineers.com
Cc: Linda Fernandez; Bill Norris
Subject: Reg. M Water Plan Typo

Jake,
Found a major typo in the Reg. M water plan.

Chapter 2 page 1, Table 2.1: Population and Water Demand Projections Summary for the Rio Grande Regional Water Planning Area (RGRPA)
Year: 2000 Pop: 1,236,246
Year: 2010 Pop: 1,581,207
Year: 2020 Pop: 1,973,188
Year: 2030 Pop: 2,401,223
Year: 2040 Pop: 2,854,613
Year: 2050 Pop: 337,618
Year: 2060 Pop: 3,826,001

Projected Population for the year 2050 has a digit missing---337,618 should be 3 million something.

Also in that same table "steam electric" is spelled "Eelctric"

Jody Gilliam
Fernandez Group Inc.
1300 Guadalupe, Ste. 201
Austin, TX 78701
Phone: 512-477-5445
Fax:512-477-9490
jody@fernandezgroupinc.com

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COMMENT NO.5

#5

RM0201 ⇒ IPP Comment

Lower Rio Grande Valley Development Council

FACSIMILE

Date: Sept. 26, 2005

TO: Bill Norris

Organization: NRS Consulting Engineers

Fax No. 423-7482

FROM: Anna (Toye) Bruton, Executive Secretary
LOWER RIO GRANDE VALLEY DEVELOPMENT

Following are comments on Region M Plan from US Fish + Wildlife Service.

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NO. 6

Thank you, and if you have any questions, please call. (Richard or Toye)

Total # of pages including this Fax Cover Sheet: 6

If your fax copy was incomplete or illegible, please call me @
Phone # (956) 682-3481 Fax# (956) 631-4670

#6

COMMENT NO.6

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services - LRGV SubOffice
Phone: (956) 784-7560 Fax: (956) 787-0547
Rt. 2 Box 202-A
Alamo, TX 78516
September 21, 2005

Mr. Kenneth N. Jones
Executive Director, LRGVDC
311 N. 15th Street
McAllen, Texas 78501-4705

Consultation No. 2-11-05-T-0347

Dear Mr. Jones:

This responds to your Rio Grande Regional Water Planning Group Draft Water Management Plan for Region M. The regional water plans are to be based on an assessment of future water demands and currently available water supply and are to include specific recommendations for meeting identified water needs through 2040. The plans may also include recommendations regarding strategies for meeting long-term (2040-2060) needs, as well as recommendations regarding legislative designation of ecologically unique rivers and streams, reservoir sites, and policy issues. The regional water plans and the state water plan are to be updated every five years. This is the second round of regional water planning.

General comments:

Statements that refer to specific documents or bodies of work, or statements that draw conclusions from a document or body of work, should be cited and listed in the reference section. In addition, some citations are included in the text but are not listed in the reference section. It would be helpful to the reader to know where the information can be found.

Sections 4.6.5 and 4.6.8 appear to be identical.

Specific Comments:

On page 1-6, Chapter 2 of this plan presents current and projected population and water demands. This information is reported by city and county and for the portion of each river basin within the Rio Grande Region. Water demand projections are presented for six water use categories: municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock.

Response: A significant amount of revenue is generated from birding and other wildlife viewing and yet there is not a water use category or water demand projections for wildlife use or for protection of low flow conditions to maintain water quality. Wildlife/environmental use should be included as a category.

1.1.3.1 Terrestrial Vegetative Types

On page 1-14, first paragraph, it should read: More than 90 percent of total riparian vegetation **and 95 percent of Tamaulipan Thornsrub have** been cleared since the 1900's.

1.1.4 Protected Areas

On page 1-19, first paragraph, it should read: Ten local communities and Texas Parks and Wildlife Department (TPWD) are currently in the final **stages** of planning for the World Birding Center committing $20-25 million to the project.

1.1.4.1 Lower Rio Grande Valley National Wildlife Refuge and Wildlife Corridor

On page 1-19, first paragraph, it should read: It currently includes **320** individual tracts totaling **88,044** acres.

1.1.4.2 Laguna Atascosa National Wildlife Refuge

On page 1-19, first paragraph, it should read: Laguna Atascosa NWT contains more than **88,378** -acres of land.

1.1.4.3 Santa Ana National Wildlife Refuge

On page 1-20, first paragraph, it should read: This **2,088** –acre refuge receives extensive bird watching attention because it is located at the convergence of two major migratory waterfowl flyways, the Central and the Mississippi.

1.3.4 Surface Water Quality

On page 1-33, second paragraph, and 3-98 first paragraph, it states: Although frequently identified as a concern, nutrient levels do not represent a threat to human health, nor have they supported excessive aquatic plant growth or caused widespread depressed dissolved oxygen levels.

Response: It is unclear whether this sentence is intending to claim that excess nutrients do not cause depressed oxygen levels and excessive plant growth or that nutrients are a concern in the Rio Grande but have not caused these problems in this waterbody. Please clarify and cite a reference for this statement. An increase in the level of nutrients promotes the growth of water hyacinth, it is important to reduce nutrient input to water bodies from point sources such as industrial and domestic effluents, from agriculture land where the use of fertilizers can be a significant nutrient source, and from land which has been cleared and run-off has increased. It has been speculated that increased environmental supplies of phosphorus through land runoff and effluent discharges into water bodies is responsible for nuisance growths of hydrilla and other aquatic plants. Studies suggest that this plant has a low requirement for phosphorus and that small increases in its normally growth limiting supply can produce large increases in growth and will indeed, be partially responsible for nuisance growths. Excessive growth by aquatic plants is often a symptom of watershed mismanagement. Persistent drought is now causing invasion of the noxious plant salt cedar.

3.7.3 Withdrawal Capabilities of Existing Diversion Facilities

On page 3-93, second paragraph, it states: To investigate this potential problem, the Lower Rio Grande Development Council entered into a Research and Planning Fund Research Grant Contract with the TWDB to assemble data on each irrigation district diversion facility on the lower Rio Grande that delivers water for domestic, municipal, and industrial uses. The objective of the study was to assess the irrigation district diversion facilities on the river to develop an opinion as to whether municipal water supplies could be pumped from the river and delivered under conditions when little or no irrigation water is being used.

A summary of the TWDB study funded through the Lower Rio Grande Development Council included the following recommendation on Page 3-96: *5. Negative environmental effects resulting from the low flows, such as potential fish or wildlife damage, need to be addressed by those water right holders (Texas Parks & Wildlife, U.S. Fish and Wildlife, etc.) who have the water reserves that could possibly alleviate these conditions. No other water right allocation holders should use their reserves for this purpose.*

Response: It would be impossible for the water held by the TPWD and USFWS, even if it were all released, to remedy the effects of low DO in the Rio Grande, therefore, this recommendation is unfeasible. Sufficient water must be maintained in the river in order to meet its aquatic life use designation. Failure to meet dissolved oxygen standards would result in a 303(d) listing and a TMDL. The U.S. Fish and Wildlife Service (Refuge) water rights are primarily used to support agriculture through its cooperative farming program.

3.9.2 Arroyo Colorado

On page 3-101, paragraph 2, it states: The fish consumption advisory was modified in 2001, lifting Restrictions except for one species, small-mouth buffalo. In response to these use impairments, the TCEQ has performed a Total Maximum Daily Load (TMDL) study to assess the specific causes of the observed pesticide and PCB problems and to determine the pollution controls necessary to restore water quality in the Arroyo Colorado. A plan to reduce the pollutants is currently being implemented. Concentrations are generally declining over time.

Response: This paragraph is somewhat misleading since it discusses a number of pollutants. Some of the legacy pollutants are declining over time but not all of the pollutants mentioned in this section are declining. Perhaps the last sentence should read "A plan to monitor pollutants is currently being implemented and fish advisories will be lifted as concentrations decline over time.

3.9.3 Laguna Madre

On page 3-101, first paragraph it states: The concerns identified are depressed dissolved oxygen and elevated nitrogen, which results mainly from agriculture runoff and from municipal wastewater discharges.

Response: This statement contradicts the statement on page 3-98 last paragraph that states, Although frequently identified as a concern, nutrient levels do not represent a threat to human health nor have they supported excessive aquatic plant growth and **caused widespread depressed dissolved oxygen levels,** not to mention invasion of salt cedar.

4.5.1 Acquisition of Rio Grande Water Rights Through Urbanization

4.4 Regional Drought Preparedness

On page 4-23, second paragraph, it states: Based on current TCEQ records, it also appears that all municipal water suppliers have not complied with state requirements to prepare drought contingency plans. While such plans may not be necessary for responding to water supply shortages, there are other conditions, which may from time to time require voluntary or mandatory curtailment of non-essential municipal water uses.

Response: It seems like all municipal water suppliers should have a mandatory drought contingency plan in order to operate because there is no incentive for those who have the plans completed. Everyone needs to be on board if the Valley is serious about water conservation during drought situations. With the drought contingency plan in place, then every municipal water supplier will be striving to conserve non-essential municipal water use when drought conditions persist. The TCEQ Texas Administrative Code, Title 30, Environmental Quality, Chapter 288, Water Conservation Plans, Drought Contingency Plans, Guidelines and Requirements should be implemented and enforced.

4.5.1.2. Water Supply Yield

On page 4-25, second paragraph, it states: As land is transformed from agricultural use to urban use, the water rights associated with that land are often converted to DMI use. Irrigation water rights are converted to municipal water rights on a 2-to-1 basis. In other words, 2 acre-feet of irrigation water can be converted to 1 acre-foot of DMI water. As can be seen in Table 4.17, there will be a reduction in irrigation demand of 227,898 ac-ft of water by year 2060. Should all of that supply be fully converted to DMI use, a potential DMI supply of 113,949 would result.

Response: Some of the agricultural use should be converted to environmental in-stream use.

4.5.1.4 Environmental Impact

On page 4-28, second paragraph, it states: There are little or no additional environmental impacts associated with the conversion of Rio Grande irrigation water rights to DMI use. Since the Acquisition of additional Rio Grande water, either through purchase, exclusion, or contract, involves changes in the type, location, or owner of water rights; TCEQ handles it as a routine administrative process and does not require a detailed evaluation for proposed amendments to Rio Grande water rights.

Response: The reduction in irrigable acres and runoff flows will have a negative impact to terrestrial wildlife and wetlands especially during drought conditions. The conversion of irrigation water rights to DMI will have a negative impact to wildlife and habitat because cropland is being converted to urbanization and that is loss of wildlife habitat and increase of contaminated runoff flows. While the actual conversion of water rights from irrigation to DMI will have some environmental impacts, the conversion of land from agricultural to urban will result in changes in the constituents of stormwater runoff. Water quality in ditches could be improved or degraded depending on the Best Management Practices that are employed.

4.5.2. Non-Potable Water Reuse

4.5.2.1. Strategy Description

Third paragraph, it states: One negative aspect of non-potable reuse is the accumulation of byproducts over time in the irrigated soil. Since recycled wastewater normally contains higher levels of salts or other minerals, and those minerals may accumulate over time where the water is applied. Usually physical and biological processes in the soil offset this concern, unless the concentration of a pollutant is usually high.

Response: The accumulation of byproducts over time in the irrigated soil will have a negative impact on soil quality by changing the ph in soils with the increase of salts through time and increase of contaminants. These could also impact the ground water. This should be under 4.5.2.4 Environmental Impact.

Fourth paragraph, it states: Another negative effect is the potential consumer confusion between potable and non-potable water piping. Mixing up potable and non-potable water pipes is a concern when users of recycled water include ordinary residences. Industrial users typically do not suffer such problems, but small children may drink from a home faucet that is intended solely for irrigation water. Because treated wastewater could contain harmful substances, the consequences of ingestion can be significant.

Response: This should be a health issue concern under 4.5.2.4 Environmental Impact.

4.5.6.4. Environmental Impact

On page 4-51, under paragraph three, it states: The goal should be to increase our understanding of any environmental concerns for the protection of environmental resources. This understanding will allow for a more effective way of dealing with concentrate disposal based on a sound knowledge of the nature of membrane concentrate. The planning and implementation of a reverse osmosis facility will require the processing of a membrane concentrate disposal permit. It is important for the utility to have the confidence that the given permit will be allowed to be renewed after the expiration date. Therefore, it is necessary to push for well established regulations for evaluation of membrane concentrate permits.

Response: Chapter 3 outlines the mineral content of the various aquifers in the LRGV. Some of the brackish groundwater contains levels exceeding current drinking water standards, which would be concentrated during the RO process to levels that may impact wildlife. Therefore, it is very important that protective regulations are in place prior to issuing any additional RO wastewater discharge permits.

6.1 Water Conservation Plan

On page 6-2 on number six, water-wise landscape design:

Response: Need to add under 6.5 Water Conservation Tips: Promote the use of native plant species that will be more droughts tolerant and require less water use than non-native plant species.

8.3.1 Recommendations in 2000 Plan

On page 8-16, first paragraph it states: - As noted in Chapter 7, one possibility for maintaining and increasing environmental flows is the purchase of Rio Grande water rights by an environmental entity. Deposited in a trust, these water rights could be managed to produce sufficient flows throughout the region. However, this option may not be viable because of the current water rights purchase and transfer structure. In addition, because of the WUG format currently being implemented by the TWDB, no option exists to formally allocate projected water supplies for environmental use. Environmental flows in the Rio Grande could be included, as a separate WUG in the next round of regional planning to ensure minimums would be met in a manner consistent with all other WUGs.

Response: Including environmental flows as a separate WUG in the next round of planning is a positive step forward. However, to move further with this issue, projections for environmental flows should be discussed and included in Chapter 4.

We appreciate the opportunity to provide pre-planning information and look forward to providing any further assistance.

If we can be of further assistance, please contact Ernesto Reyes at the above letterhead and telephone number.

Sincerely,

Ernesto Reyes Jr.

Ernesto Reyes Jr.
Senior Fish & Wildlife Biologist
For
Allan M. Strand
Field Supervisor

cc:
Field Supervisor, U.S. Fish and Wildlife Service, Corpus Christi, TX
Ken Merritt, STRC Project Leader, Alamo, TX

R: 10201 => IPP Comment

September 30, 2005

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NO. 7

Mr. Kenneth Jones
Executive Director, LRGVDC
311 N. 15th Street
McAllen, Texas 78501-4705

Re: Review of Region M Rio Grande Region Initially Prepared Water Plan

Dear Mr. Jones:

Thank you for the opportunity to review and comment on the 2005 Initially Prepared Regional Water Plan (IPP) for Region M the Rio Grande Water Planning Region. Texas Parks and Wildlife Department (TPWD) acknowledges the time, money and effort required to produce the regional water plan as mandated by Senate Bill 1 of the 75th Legislature. A number of positive steps have been taken since the first planning cycle to advance the issue of environmental protection. For example, the regional water planning groups were faced with a new requirement under 31 TAC §357.7(a)(8)(A), to perform a "quantitative reporting of environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico" when evaluating water management strategies. TPWD recognizes that each region's unique natural resources, water management strategies and funding limitations dictated the level of quantitative analysis for each regional plan. Nonetheless, TPWD feels strongly that quantification of environmental impacts is a critical step in planning for our state's future water needs while also protecting environmental resources.

TPWD staff has reviewed the IPP to determine if the following questions were addressed:

- Does the plan include a quantitative reporting of environmental factors including the effects on environmental water needs, habitat?
- Does the plan include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the plan discuss how these threats will be addressed?
- Does the plan describe how it is consistent with long-term protection of natural resources?
- Does the plan include water conservation as a water management strategy? Reuse?
- Does the plan recommend any stream segments be nominated as ecologically unique?
- If the plan includes strategies identified in the 2000 regional water plan, does it address concerns raised by TPWD at that time?

#7

COMMENT NO.7

Attachment

Specific Comments
-Page 4-64 – In item 4.6.3.4 Environmental Impacts, 3rd line, endangered is misspelled.
-Page 8-3 – Item 8.1.2 Candidate Stream Segments, last sentence does not correctly describe the stream segment that was nominated. The correct stream segment that a motion to accept was made for was the mouth of the Rio Grande upstream to the upstream boundary of the US Fish and Wildlife Service Tulosa tract.

Charlene Torres

From: Bill Norris [bnorris@nrsengineers.com]
Sent: Thursday, September 29, 2005 7:04 AM
To: Charlene Torres; Jake White
Subject: FW: water plan

Additional comments.
--
Joseph W. (Bill) Norris, P.E.
NRS Consulting Engineers
1222 E. Tyler, Suite C
Harlingen, Texas 78550
(956) 423-7409
(956) 423-7482 FAX
(956) 535-1449 Cell

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SEP 29 2005
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NO. 9

------ Forwarded Message
From: Ken Jones <knjones@lrgvdc.org>
Date: Wed, 28 Sep 2005 21:37:45 +0000 GMT
To: Richard Hinojosa <rhinojosa@lrgvdc.org>
Cc: Toye Bruton <info@lrgvdc.org>
Subject: Fw: water plan

Additional Plan comments.

Ken.
-----Original Message-----
From: "Charles Cockrum" <charles.cockrum@rmico.com>
Date: Wed, 28 Sep 2005 13:23:33
To:<knjones@lrgvdc.org>
Subject: water plan

Kenneth N. Jones, Jr.

Executive Director

LRGVDC

(956) 682-3481

knjones@lrgvdc.org

COMMENT NO.9

Dear Mr. Jones,

I would like to make a few comments about the Water Plan. First I believe that an introduction is in order. I represent Tastewater, Inc. in Dallas. We have among our product lines a means of extracting water vapor from the air for domestic water use. Our equipment is being targeted for medium (1000-15,000 gallons per day) up to supplementary water supply(10,000-100,000 or more acre-feet per year) yields.

My comments are specifically concerning using new sources of water that are drought resistant by their nature. In your plan you have included condensate reuse in the rainwater catchment section. As a water source that is also drought-resistant, condensate reuse is an excellent one. Of course, rainwater catchment is not a practical source for drought periods, however it works well when it is raining.

Our method draws upon the same water source as the condensate reuse alternative; that is, we draw the water vapor directly from the air. The condensate reuse method draws water from the atmosphere as a result of air conditioning, and is therefore practically free. In other words, the operating costs are allocated to the primary function of air conditioning, and the condensed water is a beneficial side effect. If this method had as its primary function the production of water, then the cost of that water would be between $ .10 and $ .15 per gallon. We utilize natural heat sinks, and a preparatory method called LoTEG to reduce the resistance to condensation that water vapor may otherwise tend to have. We believe that the cost of water from our apparatus will be a fraction of the mentioned above. As a further aid in reducing the load on traditional water sources for irrigation, we are developing a low cost method for desalination of brackish aquifer or even sea water. This meth!
od will not dump salts and other unfriendly minerals into the field as certain drip irrigation injection methods propose to do, and we believe it offers a far better result overall for other reasons as well.

We would like to be considered as part of your plan, under condensate reuse, and brackish water irrigation. Please contact either Mr. Mark Breheny @ (469) 519-1087, or myself @ (303) 664-5000 for questions or any further information.

Sincerely,

Charles Shea Cockrum

Taste Water, Inc.

Sent via Cingular Xpress Mail with Blackberry

------ End of Forwarded Message

L O W E R R I O G R A N D E A U T H O R I T Y

For the River ~ For the Future

PROPOSAL TO ASSUME DUTIES OF THE LOWER RIO GRANDE WATER COMMITTEE

EL MORILLO PUMPING PLANT

Submitted May 11, 2005

c/o Lower Rio Grande Development Council • 11 N. 15th Street, McAllen TX 78501-4705 • tel: 956.682.3481 • fax: 956.631.4670 • www.lrga.org

PUBLIC COMMENT #10

10

Table of Contents

About the LRGA

The Lower Rio Grande Authority (LRGA) was established in 1951 under authority of the Texas Constitution, Article XVI, Section 59, which authorizes conservation and reclamation districts. Its function is to control, store, preserve, use, and distribute the waters of the Rio Grande belonging to water users and districts that contract with the Authority. The LRGA area includes the membership of irrigation districts residing in the counties of Cameron, Willacy and Hidalgo as shown on the map below.

The LRGA has authority to exercise powers and functions including:

- to control, store, preserve, use and distribute only that share of the waters of the Rio Grande belonging to the water users and districts.
- to drain and reclaim lands within the boundaries of the Authority, to develop drainage systems, and to provide for drainage of lands within the the Authority's boundaries.
- to protect lands within the Authority's boundaries against flood and overflows.
- to develop and generate, or to otherwise acquire, electric power and to transmit, distribute and sell same within or without the Authority's boundaries.
- to acquire by purchase, lease, or gift in any manner (other than condemnation) and to maintain, use, and operate any and all property.

- to acquire by condemnation any and all property.
- to construct, extend, improve, and maintain all facilities of any kind necessary or convenient to the exercise of the powers, rights, privileges and functions possessed by the Authority.
- to make contracts and to execute all instruments necessary or convenient to the exercise of the powers, rights, privileges and functions of the Authority.
- to borrow money for its corporate purposes, and to borrow money and accept grants from the United States of America.
- to make and issue its negotiable bonds for moneys borrowed.
- other provisions further described in Section 59 of Article XVI of the Constitution of Texas.

El Morillo Drain – Project Understanding

The LRGA understands the Committee's efforts to eliminate salt intrusion into the Rio Grande upstream of Anzalduas Dam through the natural channel known as the El Morillo Drain. An estimated 300,000 tons of salt per year was flowing through the Drain into the Rio Grande, raising salt levels in the only water source available to agricultural and municipal users on both sides of the river.

Since construction of the diversion canal in 1969, most of the salt has been diverted each year. Ongoing maintenance and repairs are required to keep the Drain in working condition. These funds are provided by the counties represented on the LRGA (Hidalgo, Cameron and Willacy) and the IBWC. The LRGA will continue to provide the same high level of support if chosen to assume the Committee's duties. The LRGA will also provide certain flood control duties currently provided by the Committee.

Experience

The LRGA is composed of a conference of irrigation districts from Cameron, Hidalgo, and Willacy counties. Conference members select a board of directors composed of four members residing and owning taxable property in Cameron County, four from Hidalgo County, and one from Willacy County. Directors serve staggered two-year terms.

Although full membership is limited to irrigation districts, the LRGA has elected to extend nonvoting membership to municipalities and other interested parties.

The LRGA has five standing committees: Legal; Treaty; Regional Water Planning; Bylaws; and Local / Federal / State Representative Committees.

The members of the Authority are exclusively stakeholders in the Rio Grande Valley and share the best interests of water issues important to those who reside in the area. Each member and Ex-Officio member brings experience from the supplier, farmer and municipal consumer perspectives.

1. **Members/Board**

Board of Directors

- Bobby Sparks, President, Valley Acres Irrigation District
- Tito Nieto, Vice-President, United Irrigation District
- Gordon Hill, Interim Secretary-Treasurer, Bayview Irrigation District
- Paul Heller, Hidalgo County Irrigation District No. 16
- Joe Pennington, Delta Lake Irrigation District
- Frank Ruiz, Cameron County Irrigation District #6
- Harold Seiver, Jr., Donna Lake Irrigation District
- Rick Smith, La Feria Irrigation District Cameron County No. 3, Santa Maria Water Control Improvement District Cameron County No. #4
- Frank "JoJo" White, Hidalgo & Cameron Counties Irrigation District No. 9

2. **Ex-Officio Members**

- Charles W. "Chuck" Browning, Jr., North Alamo Water Supply Corp.
- Honorable Ricardo Morales, Mayor, City of Donna
- Honorable Norberto "Beto" Salinas, Mayor, City of Mission
- Honorable Sally Arroyo, Commissioner, City of Brownsville

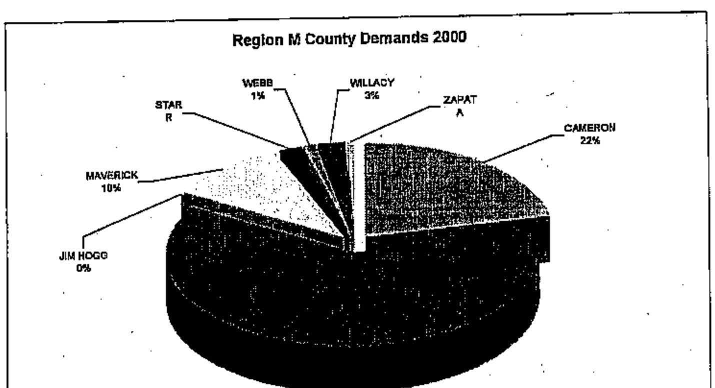
3. **Proposed Legislation**

The LRGA is actively pursuing legislation to afford ex-officio members full voting rights on the Board of Directors.

4. **Projects**

- Water Market - The LRGA Water Market is an innovative service designed to help resolve water supply needs along the middle and lower Rio Grande. For the first time ever, information about available water is readily accessible, streamlining transactions between water sellers and buyers. Sellers set their own price for their water. Listings are anonymous. An administrative fee is charged by LRGA for handling each transaction, including an approval and verification process. The administrative fee is $1.00 per acre-foot up to 250 acre-feet, and $0.50 thereafter, up to a maximum of $750.00 for any single transaction. The minimum fee charged for any transaction is $50.00.

- Comprehensive Master Planning of Valley Water Supply Needs - The LRGA has applied for and received a commitment of $200,000 over a two-year period to identify water conservation projects and develop a capital improvements plan for the next 15 years for Cameron, Hidalgo, and Willacy counties. Cost of plan development is $475,000. Because of the joint efforts and benefits of municipal and agricultural interests, matching funds are being solicited from all water users in the three-county region. Key components of the plan include most issues and priorities contained in feedback from the Valley Water Summit:
  - Summarize previous plans and projects and identify missing information.
  - Evaluate demand on agriculture as a result of urbanization and alternative strategies.
  - Evaluate municipal delivery systems.
  - Evaluate success of water conservation projects.
  - Evaluate each irrigation district's needs, delivery points, etc.
  - Identify needs on existing available mapping systems. Identify mapping deficiencies.
  - Evaluate economic development aspects of loss of water, agriculture, and urbanization .
  - Protect water supply needs by addressing treaty issues and aquatic weed infestation, and evaluate the impact of water management strategies and the conversion of water rights to and from municipal and irrigation.
  - Identify regional supply opportunities to save costs and maximize efficiencies.
  - Prepare 5-, 10-, and 15-year capital improvements plans based on a priority system with regard to maximized water savings criteria to be established.
- Active Web-Based Information System - The LRGA has a website to provide the public with news and LRGA information, a water market site, project information, requests for proposals, policy issues, meetings information, and contact data. This actively maintained site keeps information up to date. at www.lrga.org.



Regional Water Demand

The LRGA's three-county area holds more than 87% of the the Rio Grande Regional Planning area's water demand. This area consists of the 8 counties along the Rio Grande, from Maverick to Cameron.

Proposals for Consideration

- Assignment of the Water Committee's interests in the El Morillo project
- Provision of administrative support for the Water Committee's functions
- Consultations with the current Board of Directors as advisors in the day-to-day management of the Water Committee

All proposals contained herein are subject to the approval of the Board of Directors of the Lower Rio Grande Water Authority.

Economic Considerations

The LRGA will absorb all administrative costs related to the transition and operation of options outlined above. Therefore, no administrative costs will be charged to the existing and future water committee fund.

Why LRGA?

LRGA is the logical entity to assume the duties of the Rio Grande Water Committee for the following reasons:

- Established Water Authority
- County coverage area consistent with Committee
- Financial backing of water stakeholders
- Stakeholders have most to gain from control of salty runoff
- No cost to administer operations through the LRGVDC

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Law Offices
of
GLENN JARVIS

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Inter National Bank Building
1801 South Second Street, Suite 550
McAllen, Texas 78503

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September 13, 2005

Via email and regular mail
Mr. Joseph W. Norris, PE
Region M Planning Consultant
NRS Engineers
P.O. Box 2544
Harlingen, TX 78551

Re: Initially Prepared Rio Grande Regional Water Plan

Dear Bill:

In reviewing the Initially Prepared Regional Water Plan and especially Chapter 8 dealing with legislative recommendations (8.3), I would suggest the addition of additional language in a separate paragraph which pertains to the recommendation that the TCEQ should provide assistance to the Planning Group as it reviews rules on converting water rights from one use to another and consider appropriate rule amendments if necessary.

I would suggest the addition of an additional paragraph to be inserted following the paragraph dealing with the Watermaster Advisory Committee activities to read along the lines as follows:

"Currently, when the purpose of use of irrigation water rights is changed to municipal and industrial use, a conversion factor provided in 30 TAC § 303.43 is applied so that the municipal use after conversion will receive a ' . . . definite quantity of water in acre-feet per annum. This Commission rule was to make available a definite quantity of water consistent with the treatment of certain municipal, industrial and domestic allocations stipulated to and approved in the Final Judgment of the Valley Water Suit, which Judgment provided for a reserve of 60,000 acre feet per annum to be held for domestic use and use by cities to support these allocations. This reserve has now been increased to 225,000 acre feet. This conversion rule was adopted by the then

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Texas Water Rights Commission on July 2, 1986, following the conclusion of the Middle Rio Grande Adjudication. It is believed that with the knowledge gained by the WAM and other information developed in the Regional Planning process that this practice and rule should be reviewed with respect to long term water management practices on the Lower and Middle Rio Grande downstream from Amistad Reservoir. Additional studies are required analyzing the long term impact of reducing authorized municipal and industrial use rights in order to provide a defined entitlement and what impact it will have on conservation of water in both Amistad and Falcon Reservoirs."

I would also suggest that the bullet recommendations contained in 8.3.2, the eighth recommendation be changed to read as follows, the change in language is underlined:

"The Texas Commission on Environmental Quality should provide assistance to the Rio Grande RWPG as it reviews rules on converting water rights from one use to another and considers appropriate rule amendments <u>if necessary</u>."

Thank you for your attention to these comments.

Sincerely,

Glenn

Glenn Jarvis

GJ:kjw

cc: Ken Jones, LRGV - via facsimile

Mgrs\Norris letter 9-13-05

Texas Wildlife Association
"Working for tomorrow's wildlife ... TODAY!"
401 Isom Rd., Suite 237 • San Antonio, TX 78216 • 210/826-2904 • 800/839-9453 • FAX 210/826-4933

September 21, 2005

Mr. Glenn Jarvis
Chairman, Region M Water Planning Group
Law Offices of Glenn Jarvis – InterNational Bank
1801 South 2nd Street, Suite 550
McAllen, Texas 78503

Dear Mr. Jarvis:

Thank you for leading Texas' vital water planning efforts. At the Texas Wildlife Association (TWA), we support customized solutions created as close to the affected resource as possible; therefore, we appreciate your planning committee's ongoing commitment to the resources in your care.

The TWA is a non-profit organization representing private land stewards, land managers, hunters and anglers from across the state of Texas. Our members care for and control more than 30 million acres of rangeland and wildlife habitat that are key components of Texas' upstream watersheds. The involvement of private land stewards is critical in establishing Texas' long-term water policies.

As you finalize your regional plan, we would be remiss if we did not bring voluntary land stewardship to your attention again. The relationship between the land's condition and the quality and quantity of water available to Texans is inextricably linked. In fact, good land stewardship encompasses a myriad of activities far beyond brush control. (For an all-encompassing definition and discussion of land stewardship, please see the attached Handout A and the November 2005 edition of "At Issue" written by Robert L. Cook, Executive Director of the Texas Parks & Wildlife Department.) Private landowners who optimize the condition of their land are effectively engaged in water ranching, in addition to the more visible activities of raising cattle or managing wildlife.

Open space land is Mother Nature's sponge, capturing water for both our underground and surface supplies. The land's condition determines how much water is captured for our aquifers, rivers, lakes, streams, bays and estuaries or how much water is lost to detrimental run-off and evaporation.

Incorporating good land stewardship into any water plan makes sense because, voluntary land stewardship is:

***Complementary:** Optimizing the condition of Texas' rural water catchments (also known as watersheds) ensures the increased effectiveness of any other water supply strategies that may be implemented. Years of scientific research has shown that effective, efficient rural water catchments will provide more water, better water and more options for water planners. Good land stewardship is the foundation upon which all other water supply strategies should rest.

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***Cost-effective:** Improving the condition of the state's rural water catchments is relatively inexpensive. The cost for generating additional water through voluntary land management practices is dozens of dollars per acre-foot, and sometimes it's no-cost. Other proposed methods generate additional water at the cost of hundreds or thousands of dollars per acre-foot.

***Sustainable:** Responsible, voluntary land stewardship is a sustainable practice. Once people begin to implement the best management practices necessary to optimize the range in their particular location, those practices can continue uninterrupted.

***Efficient:** Good, voluntary land stewardship does not make more rain; it just makes the most of what we receive. Obviously, a well-managed landscape with 75 percent rainfall efficiency captures more usable water than a poorly managed one with 25 percent efficiency. With 75 percent rainfall efficiency, the landscape could benefit from increased water percolation and vigorous plant performance. With 25 percent rainfall efficiency, the landscape will operate under drought conditions even in years with normal rainfall.

***Environmentally Sensitive:** Good, voluntary land stewardship practices not only optimize the rural water catchments, but also provide exceptional wildlife habitat while conserving our state's remaining open space land. Good, voluntary land stewardship solves problems rather than creates them.

***Multi-faceted**: Good, voluntary land stewardship practices are not a "one size fits all" proposition. Each ecological region may require a different set of management practices to achieve the best results, and we will see more immediate results in some ecological regions than in others. Fortunately, this creates a great deal of flexibility, allowing prioritization and long-term planning.

While brush management can be part of good land stewardship, it is not the only option for rangeland management and improvement; therefore, Best Management Practices (BMPs) should be part of any cost-share, public-private program and/or contract. The BMPs should consistently include range re-seeding and livestock deferment to successfully establish native vegetative stands as well as good follow-up grazing management.

***Governable:** In order to promote even better land stewardship, policy makers should consider implementing Best Government Practices (BGPs). BGPs, as used in other states, provide a wide range of options that might include: increased cost-shares at targeted, prioritized water enhancement sites; increased technical assistance in range and wildlife management planning; a system of Purchases of Development Rights to keep priority properties together under good management; and reduced valuations, tax breaks, or other incentives for participation in water enhancement management practices.

Voluntary land stewardship is the logical place for water management to begin because land stewardship affects the water supply at its origins, not just at its destination. We find it difficult to understand why people charged with water management focus their efforts on destination and demand, while virtually ignoring the issues of origination and supply. If we maximize the effects of the rainwater that falls from the sky, then the answers to questions of demand are much more easily answered.

Water harvesting provides one example of water-induced tunnel vision. In most water plans, a great deal of space is dedicated to water harvesting, collecting the rainwater that falls on roofs – roofs that are generally measured in square feet. But yet, these same plans ignore the millions of acres of "unroofed" rangeland that are the foundation for the region's water catchment. Why? The rainwater harvested from rural grasslands, savannahs, forests, and wetlands is not as easily visible as that collected from urban rooftops.

Ground and surface water supplies originate with the rain that falls on the land and is captured by a complex, large-scale process involving plants, soil and animals. When the process functions optimally, floods are reduced, aquifers are replenished, and water is released more slowly and steadily into streams, rivers, lakes and eventually our bays and estuaries. If the land is in good condition, the quality and quantity of water – both surface and underground – available to citizens reflect that condition. When the process is working well across millions of acres of open, rural land the contribution to the state's water supply can be tremendous.

Interestingly, when conscientious land stewards ably manage their resources as they do every day, they are ranching water just as surely as they are ranching cattle, sheep, goats or wildlife. Unfortunately, this contribution is overlooked or misunderstood. We must include voluntary land stewardship – on a grand scale – as one of the foundation solutions for water issues in Texas.

When it comes to water policy, good land stewardship is like the first step on a staircase. The staircase will stand if you remove the last step, a middle step or even the second step, but the staircase will come crashing down if there is no first step. Please help Texas ensure that this very vital first step is in place as the foundation of planning for our future.

To help you incorporate voluntary land stewardship into your plan, we have taken the liberty of enclosing our report, "Texas' Looming Water Crisis: Recognizing Land Stewardship's Untapped Potential," which we believe would fit your purposes well. Please use the information to help Texans secure their future.

If you have any questions, please do not hesitate to contact us using the information below.

Yours for a clean and enjoyable outdoors,

Kirby Brown

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David K. Langford

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Handout A

What is Voluntary LAND STEWARDSHIP?

(It's a lot more than just brush control...)

- Absorbing Rainfall/Reducing Run-Off/Increasing Base-Flow
- Using Prescribed Fire Properly
- Planning and Managing Grazing (Including Deferment...)
- Managing Brush Appropriately (It's never controlled, and some of it's important for wildlife!)
- Managing Erosion
- Reseeding With Natives (As Necessary...)
- Wildlife and Habitat Management Plans
- Managing and Restoring Riparian Areas
- Protecting Springs and Creek Banks
- Increasing Bio-Diversity
- Conserving Rare Species
- Limiting Habitat Fragmentation with Appropriate Estate Planning
- Being a Good Neighbor
- Contributing to Your Community
- Conserving Aquifer Recharge Areas
- Managing Exotic Species (Flora and Fauna) as Appropriate
- Investigating Existing and New Incentive Programs (PDRs, CRP, GRP, LIP, etc.)
- Being Open to New Ideas, Constantly Evaluating Plans/Methods, and Adjusting as Indicated
- Getting Informed, Getting Involved, VOTING, etc.

Land stewardship shifts thinking and vocabulary because good land stewardship allows the land to catch water instead of shed it.

Rural land is a water CATCHMENT not a waterSHED!!!!

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AT ISSUE

FROM THE PEN OF ROBERT L. COOK

Land. They say they're not making any more of it, you know, and they say there is less and less of it everyday. If you love the outdoors, and nature, and seeing critters and beautiful sunsets, and hearing bullfrogs and katydids, you know what I mean. People have fought and died over land, and ranched and plowed and lived off the land since the beginning of time. Every day, more land washes downstream to the oceans, the mountains become a little less rugged, and we who cherish the land so deeply pave over and build homes and offices atop another 2,800 acres of land in Texas every single week. The folks at the United States Department of Agriculture tell us that between 1982 and 1997, 2.2 million acres of rural land in Texas were converted to "urban uses." You can bet it is worse today. I'm scared to ask.

I reckon that some folks think that the only things that land is good for is either cows or some undistinguishable crop of who knows what, or for folks like me who love to tromp around in the brush and breathe fresh air. Who needs all that, right? Take a wild guess where that rib-eye and baked potato that you eat tonight comes from, or how that cotton that you wear on your back got there. Whichever it was that came first, both the chicken and the egg were produced on the farm and both required a lot of cracked milo and corn before they reached your refrigerator. And for those of you who sneer at us meat-eaters, I hope that you will pause momentarily to consider what an immense effort and expense is required to produce your diet of whole grain, granola bars, fresh fruit and "farm-raised" vegetables.

Private landowners in Texas are critical to our livelihood, our lifestyle and our welfare. Land conservation programs are essential to our food and water supply.

Maybe if we realized how dependent we all are on rural, undeveloped land, it would help us understand the need to preserve and protect that land. OK, try this: "the land" that we're talking about here is where your water comes from! That's right, the water that you drink, and bathe in, and wash your dishes with is produced on our land. Since water initially falls from the sky, some folks don't see how land fits into the equation. Unless you've got a cistern to catch the water that runs off your roof, your water comes from the land. Every drop of water that we require in our homes, industry, agriculture and for fish and wildlife falls back to earth in the wonderful cycle of evaporation, rainfall and snow. Some of it soaks deep into the soil to replenish our aquifers; some of it filters through the grasslands and then flows down our rivers and through our lakes where we harvest it and use it. Then the cycle starts all over again. We all need, use and benefit from "the land".

Private landowners in Texas are critical to our livelihood, our lifestyle and our welfare. Land conservation programs and agricultural conservation easements that keep rural land in farm and ranch production are essential to our food and water supply. The Texas Farm and Ranchland Conservation Program, which was recently enacted by the Texas Legislature to help keep rural land in the hands of farmers and ranchers in Texas, and to encourage, support and reward good land stewardship, is a great new program for our state. In addition, it is important to remember that Texans need more rural, undeveloped parkland and wildlife lands where public access for hiking, camping, boating, biking, hunting, fishing and outdoor recreation use is welcomed and encouraged for current and future generations.

You know what they say: Life is better outdoors.
Get outdoors, enjoy.

Robert L. Cook

EXECUTIVE DIRECTOR

Texas Parks and Wildlife Department mission statement:

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

NATIONAL WILDLIFE FEDERATION www.nwf.org

ENVIRONMENTAL DEFENSE finding the ways that work

SIERRA CLUB FOUNDED 1892

September 30, 2005

Rio Grande Regional Water Planning Group
c/o Mr. Kenneth N. Jones
Executive Director, LRGVDC
311 N. 15th Street
McAllen, Texas 78501-4705

Re: Comments on Initially Prepared 2006 Rio Grande Regional Water Plan

Dear Mr. Jarvis and Planning Group Members:

The National Wildlife Federation, Lone Star Chapter of the Sierra Club, and Environmental Defense appreciate the opportunity to provide written comments on the Initially Prepared Rio Grande Regional Water Plan. We consider the development of comprehensive water plans to be a high priority for ensuring a healthy and prosperous future for Texas. We recognize and appreciate the contributions that you have made towards that goal. As you know, our organizations have provided, either individually or collectively, periodic input during the process of developing the plan. These written comments will build upon those previous comments in an effort to contribute to making the regional plan a better plan for all residents of the Rio Grande Region and for all Texans.

We do recognize that the draft Plan is subject to revision prior to adoption and is subject to continued revision in the future and provide these comments with such revisions in mind. Our organizations appreciate the amount of effort that has gone into developing the draft Plan for the Rio Grande Region. Your consideration of these comments will be appreciated.

I. BACKGROUND AND OVERVIEW

Our organizations support a comprehensive approach to water planning in which all implications of water use and development are considered. Senate Bills 1 and 2 (SB1, SB2), and the process they established, have the potential to produce a major, positive change in the way Texans approach water planning. In order to fully realize that potential, water plans must provide sufficient information to ensure that the likely impacts and costs of each reasonable potential water management strategy are described and considered. Only with that information can regional planning groups ensure compliance with the overarching requirement that "strategies shall be selected so that cost effective water management strategies which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are adopted." 31 TAC § 357.7 (a)(9). Complying with this charge is essential in order to develop true plans that are likely to be implemented as opposed to a list of potential, but expensive and damaging, projects that likely will produce more controversy than water supply.

This document includes two types of comments. We consider the extent to which the initially prepared plan complies with the requirements established by SB1 and SB2 and by the Texas Water Development Board (TWDB) rules adopted to implement those statutes. In addition, our comments address important aspects of policy that might not be controlled by specific statutes or rules. We do recognize that the financial resources available to the planning group are limited,

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which may restrict the ability of the group to fully address some issues as much as you would like. These comments are provided in the spirit of an ongoing dialogue intended to make the planning process as effective as possible. We strongly support the state's water planning process and we want the regional water plans and the state plan to be comprehensive templates that can be endorsed by all Texans. Key principles that inform our comments are summarized below, followed by specific comments keyed to different aspects of the initially prepared plan.

A. Maximize Water Efficiency

We strongly believe that improved efficiency in the use of water must be pursued to the maximum extent reasonable. New provisions included in SB2 and TWDB rules since the first round of planning mandate strengthened consideration of water efficiency. Damaging and expensive new supply sources simply should not be considered unless, and until, all reasonable efforts to improve efficiency have been exhausted. In fact, that approach is now mandated. Consistent with TWDB's rules for water planning, we consider water conservation measures that improve efficiency to be separate and distinct from reuse projects. We do agree that reuse projects merit consideration. However, the implications of those projects are significantly different than for water efficiency measures and must be evaluated separately.

The Texas Water Code, as amended by SB1 and SB2, along with the TWDB guidelines, establish stringent requirements for consideration and incorporation of water conservation and drought management. As you know, Section 16.053 (h)(7)(B), which was added after completion of the first round of regional planning, prohibits TWDB from approving any regional plan that doesn't include water conservation and drought management measures at least as stringent as those required pursuant to Sections 11.1271 and 11.1272 of the Water Code. In other words, the regional plan must incorporate at least the amount of water savings that are mandated by other law[1]. In addition, the Board's guidelines require the consideration of more stringent conservation and drought management measures for all other water user groups with water needs. Section 31 TAC § 357.7 (a)(7)(A) of the TWDB rules sets out detailed requirements for evaluation of water management strategies consisting of "water conservation practices." Section 357.7(a)(7)(B) addresses water management strategies that consist of drought management measures. The separate evaluation of water management strategies that rely on reuse is mandated by 31 TAC § 357.7 (a)(7)(C).

Given Region M's decision not to incorporate advanced municipal water conservation measures in the plan, there is substantial need for improved treatment of water efficiency in the plan.

B. Limit Nonessential Use during Drought

Drought management measures aimed at reducing demands during periods of unusually dry conditions are important components of good water management. As noted above, Senate Bill 2 and TWDB rules mandate consideration and inclusion in regional plans of reasonable levels of drought management as water management strategies. It just makes sense to limit some nonessential uses of water during times of serious shortage instead of spending vast sums of

[1] This is a common-sense requirement. We certainly should not be basing planning on an assumption of less water conservation than the law already requires. TWDB guidelines also recognize the water conservation requirements of Section 11.085 for interbasin transfers and require the inclusion of the "highest practicable levels of water conservation and efficiency achievable" for entities for which interbasin transfers are recommended as a water management strategy.

money to develop new supply sources simply to meet those nonessential demands during rare drought periods.

C. Plan to Ensure Environmental Flows

Environmental flows provide critical economic and ecological services that must be maintained to ensure consistency with long-term protection of water resources and natural resources. Accordingly, environmental flows should be recognized as a water demand and plans should seek to provide reasonable levels of environmental flows. Although critically important, designing and selecting new water management strategies that minimize adverse impacts on environmental flows is only one aspect of planning to meet environmental flow needs.

New rules applicable to this round of planning require a quantitative analysis of environmental impacts of water management strategies[2] in order to ensure a more careful consideration of those additional impacts. However, if existing water rights, when used as projected, would cause serious disruption of environmental flows resulting in harm to natural resources, merely minimizing additional harm from new strategies would not produce a water plan that is consistent with long-term protection of natural resources or that would protect the economic activities that rely on those natural resources. The recent silting in and closure of the mouth of the Rio Grande, largely attributed to overuse and drought, is a prime example of this. We acknowledge the ongoing discussions between the National Wildlife Federation and the planning group regarding a cooperative effort to address these issues (discussed further in our Chapter 7 comments below).

In addition, we believe that environmental flows should be recognized as a water demand and plans should seek to provide reasonable levels of environmental flows. As an example, we would note that the initially prepared plan for the Lower Colorado Region (Region K) does include such recognition of environmental flows as a water demand.

D. Minimize New Reservoirs

Because of the associated adverse impacts, new reservoirs should be considered only after existing sources of water, including water efficiency and reuse, are utilized to the maximum extent reasonable. When new reservoirs are considered, adverse impacts to regional economies and natural resources around the reservoir site must be minimized. Regardless of whether the proposed reservoir is located inside or outside the boundaries of the region, reservoir development must be shown to be consistent with long-term protection of the state's water, agricultural, and natural resources.

We continue to be disappointed to see the Brownsville Weir included as a recommended water management strategy. As stated on page 4.53 of the IPP, the firm yield of this project is 20,643 ac-ft/yr. As noted in our comments below, the City of Brownsville alone could save over 30,000 ac-ft/yr through adoption of reasonable municipal conservation measures.

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[2] The rules require that each potentially feasible water management strategy must be evaluated by including a quantitative reporting of "environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico." 31 TAC § 357.7 (a)(8)(A)(ii).

E. Manage Groundwater Sustainably

Wherever possible, groundwater resources should be managed on a sustainable basis. Mining groundwater supplies will, in many instances, adversely affect surface water resources and constitute a tremendous disservice to future generations of Texans. Generally speaking, depleting groundwater sources will not be consistent with long-term protection of the state's water resources, natural resources, or agricultural resources. We see Region M's decision to allow for up to 100 feet of water level decline in the regions aquifers over the next 50 years as conflicting with this planning directive.

II. PAGE-SPECIFIC COMMENTS

E.S. EXECUTIVE SUMMARY

[1] An executive summary is an important component of a document as large and multifaceted as the IPP. This may well be the only portion of the water plan that many members of the public would be able to read. For this reason, we strongly encourage the planning group to make a draft of the executive summary available for comment as soon as it is available.

CHAP. 1, INTRODUCTION – GENERAL OVERVIEW OF REGIONAL WATER PLANNING & SENATE BILL ONE

[2]**Section 1.3, Page 1-29, Paragraph 4.** The plan states that there are no major springs that are "extensively relied upon for water supply purposes." TWDB rules (§ 357.7 (a)(1)(D)) require a description of the region's major springs that are important for "water supply or natural resource protection" purposes. The identification of springs important for natural resource protection is a new requirement applicable for this round of planning. This is an important issue that must be addressed in the regional plan.

[3]**Section 1.3, Page 1-29, Paragraph 2.** There appears to be an incomplete sentence or extra words at end of paragraph.

[4]**Section 1.6, Page 1-39**. Increased pumping of groundwater and removal of water from storage may impact the small springs across the region mentioned on Page 1-29 that livestock and wildlife may depend on. This potential threat needs to be discussed in this section.

[5]**Section 1.6.1, Page 1-39.** The plan fails to discuss the potential impact increased use and development of Rio Grande water may have on the environmental flows that support the region's wildlife, many of the region's protected areas, and the health of the tourism-related economy. The Board's rules call for consideration of businesses dependent on environmental flows. See 31 TAC § 357.7 (a)(1)(G).

CHAP. 2, CURRENT AND PROJECTED POULATION & WATER DEMAND FOR THE RIO GRANDE REGION

We urge the planning group to acknowledge environmental flows as a category of water demand. There is precedent for such action: the initially prepared plan for the Lower Colorado River Basin (Region K) does include such recognition of environmental flows as a water demand. While we recognize limitations on the availability of information needed to quantify this water demand, the category could be acknowledged qualitatively during this round of planning with additional effort devoted to quantitative analysis in the future.

[6](Page 2-7). Section 2.3.1 Projections of Municipal Water Demand
The discussion of the derivation of the municipal demand projections is confusing. Based on our understanding, it actually appears to reflect the approach used during the last round of planning rather than the approach used for this round. Specifically, the last sentence of the second-last paragraph includes the following language: "and by taking into account dry-year water usage and water savings resulting from conservation programs supported by cities or utilities." We understand year 2000 water use to have been chosen to reflect dry year usage so we are unclear about the additional reference to "dry-year water usage." We also understand the TWDB-derived calculations to include existing conservation programs only to the extent that such programs affected calculated water use for 2000; they do not embody any savings from additional programs. We urge that this language be clarified.

The last sentence of the last paragraph states that the demand projections have embedded in them savings due to the 1991 State Water Efficient Plumbing Act. Although we don't view those savings as coming through affirmative adoption of conservation measures, but rather through natural replacement of less efficient fixtures, we do understand the standard methodology to include those savings. We believe it would be useful to include information about the amount of those savings in the plan. That same sentence also suggests that forecast demands take into account "anticipated improvements in municipal water use efficiency and in water savings associated with the <u>adoption of conservation measures</u> such as those proposed in the 1991 State Water Efficient Plumbing Act." However, we don't understand the projections to include any savings other than those anticipated through the <u>automatic</u> use or replacement of efficient fixtures in new construction and remodeling. The TWDB Exhibit B guidance indicates that any anticipated savings through the <u>adoption</u> of conservation measures would be reflected, if at all, as a water management strategy.

[7] Section 2.3.4 Projections of Steam Electric Water Demand
The water needs for steam-electric power generation seem to incorporate an unduly high demand projection with a projected increase of about 380% in water demand. By contrast, a projected population increase of around 209% is projected to result in about 176% increase in municipal water demand along with a projected 78% increase in manufacturing water demand. Thus, the projected increase in water demand for steam-electric power generation seems to be disproportionate to the sectors that are most likely to drive that demand.

We acknowledge that the steam electric demands result from the document: "Texas Water Development Board: Power Generation Water Use in Texas for the Years 2000 through 2060 Final Report, prepared for the Texas Water Development Board by Representatives of Investor-Owned Utility Companies of Texas, January 2003." From a review of that document, we understand it to include an assumption of a continuing increase in per-capita electrical power usage through 2060 at a rate of .5% per year. It does assume that new power plant capacity will be more efficient in its use of water. As energy costs continue to rise, progress in energy efficiency measures likely will result in reduced per capita usage of electricity and in demands below the projected levels. The projected 2060 demand of 32,598 acre-feet of water for steam-electric power production seems excessive.

CHAP. 3, EVALUATION OF THE ADEQUACY OF CURRENT WATER SUPPLIES

[8]**Sections 3.1 through 3.4** These sections, dealing with surface water availability considerations, especially of the Amistad and Falcon Reservoir system, are generally well written and informative.

[9]**Page 3-1:2 and Figure 3.1** - The origin of the magnitude of surface water supply available to the Region is unclear in this section. It is not till page 3-47 (Firm yield of the Amistad and Falcon Reservoir system) that the reader sees the origin of these values. A footnote or brief mention in the text would be useful here.

[10]**Section 3.5, Page 3-51:52.** The Region M IPP calculates groundwater availability based on allowing significant drawdowns in water levels for the Carrizo-Wilcox and Gulf Coast aquifers of up to 100 feet below year 2000 levels. The text goes on to describe this drawdown as calculated on an average basis across an entire county, thus localized effects could be much higher. The plan describes these levels of drawdown as "aquifer sustainability."

The problem of labeling this approach sustainable becomes apparent even in considering the next scheduled round of regional planning. As discussed on page 3-52, the withdrawals proposed here are of such a magnitude that they just meet the regional water planning group's drawdown target of 100ft on average. Thus, as soon as the next five-year increment is added to the planning horizon, the planning group will be faced with either redefining the acceptable drawdowns (that is, increasing them) or lowering the acceptable pumping levels in that decade. Thus, the level of storage depletion that the Region M group is proposing is not sustainable in the long-term, especially as many of the communities become more reliant on groundwater withdrawals to meet their growing water demands.

[11]**Section 3.6.1 Surface Water Supply Analysis** (page 3-61, under "Step 1") Text states that approx. 391,000 ac-ft/yr of diversions are in the municipal and industrial categories and that this can be seen in Table 3-5. However, Table 3-5 only lists about 349,000 ac-ft/yr for the Rio Grande basin, which is what this discussion refers to.

[12]**Section 3.6.1 Surface Water Supply Analysis** (page 3-66, third paragraph) This text describes an exercise to determine how much irrigation water would be remain available for that purpose if all anticipated demands in the "domestic, municipal, and industrial (DMI)" categories are met with conversion of irrigation rights. In this text there is no mention of the 2:1 conversion of irrigation rights that is described later on Page 4-25. That issue should be acknowledged.

CHAP. 4, IDENTIFICATION, EVALUATION, & SELECTION OF WATER MANAGEMENT STRATEGIES BASED ON NEEDS

[13]**Section 4.5.1.2, Page 4-25. Water Supply Yield** (of Acquisition of Rio Grande Water Rights). Near the bottom of this page the text states that "the appendix… [shows] a projected additional supply of over 430,000 acre-feet of water for irrigation use in 2060." However, this would seem to be more accurately described as recommended water management strategies to meet projected demands.

[14]**Section 4.5.1.4, Page 4-28. Environmental Impact** (of Acquisition of Rio Grande Water Rights). The plan states that there are "little or no additional environmental impacts associated

with the conversion of Rio Grande irrigation water rights to DMI use." We believe this conclusion requires more consideration. Given that irrigation use is seasonally based and DMI demand would be continuous, there likely will be changes in the pattern of use of the Rio Grande water that may impact the environment. Although the conversions may well be appropriate, this potential impact needs to be addressed.

[15]**Section 4.5.2.4, Page 4-32. Environmental Impact** (of Non-Potable Water Reuse). The increased reuse of municipal water would decrease the volume of water re-entering the Rio Grande and Lower Laguna Madre systems. This would reduce flows available to support in-stream environmental uses and inflow needs of the Lower Laguna Madre and mouth of the Rio Grande estuaries. Although the strategy certainly may be appropriate, it should be evaluated with explicit consideration of this potential impact (see our comments below on Section 7 and proposed cooperative work to assess).

[16]**Section 4.5.3.4, Page 4-36 Environmental Impact** (of Potable Water Reuse) The increased reuse of municipal water would decrease the volume of water re-entering the Rio Grande and Lower Laguna Madre systems. This would reduce flows available to support in-stream environmental uses and inflow needs of the Lower Laguna Madre and mouth of the Rio Grande estuaries. This potential impact needs to be addressed (see Section 7 comments and proposed cooperative work to assess).

Section 4.5.4 Advanced Water Conservation

[17]**Page 4-38.** At the outset of this section, the plan states that there are several conservation measures, such as "educational programs," "leak detection," and "commercial water conservation" embedded in the demand projections furnished from the TWDB to the region. That is not consistent with our understanding of the TWDB process. The demand projections from the Board only included anticipated savings from the 1991 State Water Efficient Plumbing Act to the extent included by the planning group and did not include other future measures. The following paragraph from the TWDB's methodology description explains the basis of the projections in relation to the Plumbing Act:

> "Water use reductions expected in future years due to continued adoption of water-efficient plumbing fixtures, as detailed in the 1991 State Water-Efficient Plumbing Act, will need to be included by the Planning Group and will be based on information and data provided by the TWDB. Any projected GPCD savings due to conservation programs to be undertaken by cities or utilities over and above the savings reflected from the 1991 State Water-Efficient Plumbing Act will be listed as a separate WMS by the Planning Group." (from Water Demand Projections Methodology available at http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Methodology.asp)

Thus, the base water-demand projections prepared for each region by the TWDB are adjusted to include water savings expected to occur through automatic implementation of the state requirements related to plumbing fixtures. This level of savings is anticipated to occur without pro-active action by the planning group, cities, or other municipal WUG, just due to the natural replacement of fixtures like low-flow shower heads and water-saving toilets in new construction and renovations and through obsolescence. In this section and in several other locations throughout the IPP (e.g., Appendix C), the plan refers to these savings as "advanced water conservation," which is not an accurate characterization.

[18]**Section 4.5.4.2, Advanced Water Conservation, Water Supply Yield.** The IPP states here that "No WUGs expressed interest in pursuing additional advanced water conservation measures." (emphasis added). Because the only water conservation measure included is compliance with the basic plumbing fixtures law, we do not understand there to be any advanced water conservation measures for any municipal WUG.

This appears to be a significant deficiency in the IPP and we encourage the planning group to reconsider this stance. Other than an unwise approach to water planning, there are statutory and planning rule implications. The Texas Water Code, Section 16.053 (h)(7)(B), which was added after completion of the first round of regional planning, prohibits TWDB from approving any regional plan that doesn't include water conservation and drought management measures at least as stringent as those required pursuant to Section 11.1271 of the Water Code. That section applies to all municipal entities with surface water rights greater than 1,000 ac-ft or using water pursuant to such water rights through contractual arrangements.

In addition, the Board's guidelines require the consideration of more stringent conservation measures for all other water user groups with water needs. If additional measures are not included the decisions not to include them must be explained. See 31 TAC § 357.7 (a)(7)(A)(ii).

Section 4.5.4.2, Advanced Water Conservation, Water Supply Yield. In addition to the points noted above, the description here of the Board's projections of municipal water demands is quite convoluted and appears quite inconsistent with our understanding of the Board's methodology.

[19] **Page 4-39.** The second paragraph states "Estimates of the amount of future municipal water demands that could be met by additional or advanced water conservation measures were developed by the TWDB." It is unclear what this is referring to. As pointed out above, the "base" demands developed by TWDB do not include any advanced conservation measures. The statement may be intended to refer to a study funded by TWDB to analyze cost and possible water savings through various water conservation measures: Texas Water Development Board, GDS Associates, *Quantifying the Effectiveness of Various Water Conservation Techniques in Texas*, March 2002. If so, we would suggest that the reference be clarified. If this is not the intent, then we request a clear explanation of what estimates of savings are being referred to.

[20] **Page 4-39.** The text describes an alternative approach by the Region of applying "advanced conservation", namely, reducing demand by 2% per decade for municipal WUGs with projected water shortages. Again, this is very confusing. The text states that "These figures were recommended by the TWDB as mandatory plumbing conservation." Savings resulting from the effects of the plumbing fixtures law must be accounted for and must be applied to each municipal WUG, regardless of whether a shortage is projected. See 31 TAC § 357.7 (a)(2)(C). However, these savings do not constitute advanced conservation and they do not require overt action. The measures discussed in Section 4.5.4.1 of the IPP are not simple implementation of the plumbing fixtures act and would produce additional savings beyond the 2% per decade amount selected as representing plumbing fixtures act implementation.

[21] This discussion is very confusing. It basically says there is no advanced municipal water conservation and then reports quantities of savings for advanced municipal conservation. As we understand the initially prepared plan, only savings from the state plumbing fixtures act have been included and only for select WUGs. Those savings must be included for all WUGs. 31 TAC § 357.7 (a)(2)(C). In addition, the plan must include advanced water conservation (i.e., measures beyond the plumbing fixtures act) for WUGs to which Section 11.1271 applies if those WUGs have projected water needs. 31 TAC § 357.7 (a)(7)(A)(i). Beyond that, additional advanced water conservation must be considered for all municipal WUGs with projected needs and, if not recommended, reasons for not recommending additional measures must be provided. 31 TAC § 357.7 (a)(7)(A)(ii).

[22] **Section 4.5.4.2, Page 4-39, second paragraph.** As stated on this page, Region M has not recommended any actual advanced water conservation measures for municipal WUGs. This leads to some continued inordinately high water use rates at the end of the 60 year planning horizon: Brownsville - 216 gallons per capita per day (gpcd); Laredo - 188 gpcd; McAllen – 192 gpcd. For context consider that the statewide average municipal water use projected for 2050 in the 2002 State Water Plan was 159 gpcd[3]. Also, a principal recommendation of the Water Conservation Implementation Task Force convened by the Board pursuant to legislation passed in 2003 is that all municipal WUGs should strive to achieve an eventual water use rate of no more than 140 gallons per person per day.

[23] **Section 4.5.4.2, Page 4-39, Table 4.27.** This table should be labeled to indicate whether the savings listed are from the effects of the plumbing fixtures code or from some recommendation for advanced water conservation. In addition, the time period for when those savings would be realized should be indicated. Please revise the text throughout the Advanced Water Conservation section, this Table, and Appendix C to reflect this distinction.

[24] **Section 4.5.4.2** There is potential for much more water efficiency savings in Region M. We have attached a Table, labeled as M-IPP 1, illustrating the potential savings in Region M with some reasonable water efficiency measures. These calculations are based upon the recommendations of the Water Conservation Implementation Task Force. Again, among other things, the Task Force proposed that all municipal WUGs should strive to achieve an eventual water use rate of no more than 140 gallons per person per day (gpcd). The second goal to guide water conservation efforts is that, in the near-term, municipal WUGs with water use above 140 gpcd should strive to achieve a one percent reduction in per capita municipal water use per year. We have used these recommendations in our calculations on how much water could be saved in Region M. Table M-IPP 1 highlights a few of the principal results for two groups: a) the top 10 population centers, and b) a few other WUGs with significantly high water use rates (greater that 250 gpcd in year 2000).

As you can see from Table M-IPP 1, the top 10 population centers, representing abut 69 percent of the region's projected population in 2060, could save 81,855 ac-ft/yr due to water efficiency measures. Most of these savings would accrue to just three WUGs: Laredo, Brownsville, and McAllen.

[3] Texas Water Development Board, *Water for Texas – 2002*, page 33.

There are eight other municipal WUGs that, although small in population, have very high water use rates. The potential savings for this group are in the bottom half of the Table M-IPP 1. Although the projected population in 2060 of these WUGs represents less than 2 percent of the total regional population, the savings are substantial at 9,939 ac-ft/yr[4]. Because of their high initial water use rates in year 2000, none of these WUGs reaches the ultimate goal of 140 gpcd by the year 2060.

If all Region M municipal water user groups were to pursue the 1 percent reduction through water efficiency measures (except South Padre Island), with most of them reaching the 140 gpcd level by 2060, it would represent savings of almost 101,016 acre-feet per year compared to what the Region is proposing.

We know that these suggested municipal water use rates are not unreasonable for Texas. San Antonio provides a real world example of the potential of improved water efficiency. Through a concerted effort, San Antonio has reduced its municipal water use to about 132 gpcd from a use level of about 213 gpcd in a period of around 20 years. This reduction was achieved through water efficiency measures without accounting for reuse.

The South Central Texas Regional Water Planning Group (Region L), in its initially prepared plan, has established water efficiency goals as follows:

> "For municipal water user groups (WUGs) with water use of 140 gpcd and greater, reduction of per capita water use by 1 percent per year until the level of 140 gpcd is reached, after which, the rate of reduction of per capita water use is one-fourth percent (0.25) per year for the remainder of the planning period; and
>
> For municipal WUGs having year 2000 water use of less than 140 gpcd, reduction of per capita water use by one-fourth percent per year."

These excerpts are from Initially Prepared 2006 South Central Texas Regional Water Plan at p. 6-1.

[25] **Section 4.5.4.3 Cost** (for Advanced Municipal Water Conservation). This section also is very confusing. There should be no particular costs associated with implementing the plumbing fixtures act. If the listed measures, which would constitute an advanced municipal water conservation program, are included then an actual cost estimate is needed. There are resources available to help estimate costs of water conservation programs such as Texas Water Development Board, GDS Associates, *Quantifying the Effectiveness of Various Water Conservation Techniques in Texas*, March 2002.

In order to have a complete comparison of water management strategies as required by Senate Bill 2 and TWDB rules we believe it is necessary to include information on the expected cost of water conservation measures and/or programs. Below are some examples from the 2005 Initially Prepared Plans for Regions C, L, and H of estimated costs for water conservation measures.

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[4] As detailed in the Table M-Initially Prepared Plan1, the savings are based on proposed water use rate with a 1% per year reduction from year 2000 water use for these high use WUGs. However, because of the high influence of tourism on water use for South Padre Island, the revised water use rate is based on a reduction of only one-half percent per year.

Table M-IPP 2 Example Cost data for water conservation programs in Initially Prepared Plans from other regions.

Region	program label	Cost per ac-ft of water saved*
C	Municipal water conservation	$177**
L	Municipal water conservation-Rural	$396
L	Municipal water conservation-Urban	$458
L	Municipal water conservation-Suburban	$520
H	Municipal water conservation	$161

NOTES: * Region L costs are amortized at 6% over the projected length of service on the measure (e.g., toilet service life = 25 years). Unclear if Region C and H costs are so amortized.

** this figure is weighted average cost for fifteen water user groups with highest volumes of proposed savings at the 2010 time frame, equaling 70% of total Region C conservation savings.

[26] **Section 4.5.4.6, Page 4-41.** This recommendation section for municipal water conservation is equally confusing. The "advanced municipal water conservation scenario defined by TWDB" needs to be identified. We are not aware of any such scenario. The "one to two percent per decade" recommendation is less than the two percent per decade figure selected on page 4-39. An accounting for plumbing fixtures act implementation is required in calculating water demands for all municipal WUGs, not just those with projected water needs. Actual water conservation practices, beyond plumbing fixtures act implementation, must be included for WUGs with water needs and additional measures must be considered for all WUGs. The tabulations for each WUG detailed in Appendix C erroneously label the default savings from the Plumbing Fixtures Act as Advanced Water Conservation and should be corrected.

[27] **Section 4.5.4.6, Page 4-41.** Additionally, the Region M stated goal is very timid. In comparison, the Conservation Implementation Task Force recommended a reduction of **1% per year** for municipalities currently using greater than 140 gpcd. An example of an advanced water conservation measure being implemented by another RWPG, Region L (South Central Texas – including San Antonio) has incorporated this strategy - to reduce per capita consumption by 1% annually until achieving a rate of 140 gpcd and then pursuing further reductions of .25% per year.

[28] **Section 4.5.5.4, Page 4-46.** While pertinent to the discussion of a seawater desalination project, the discussion on TCEQ permits needs to be handled in Section 4.5.5.5 on Implementation Issues. This would clarify the discussion on potential environmental impacts.

[29] **Section 4.5.6.4, Page 4-50.** The plan needs to address the impact to aquifer levels from an increase in the removal of groundwater. This would also include potential impacts to the fresh groundwater reserves in the same aquifers or interconnected/adjoining aquifers.

[30] **Section 4.5.7.4, Page 4-53. Environmental Impact** (of Brownsville Weir and Reservoir). The IPP lists many of the environmental impacts resulting from the project but fails to provide any quantitative analysis of those impacts, as required by TWDB rules. See 31 TAC § 357.7 (a)(8)(A)(ii). The purpose of that required quantitative analysis is to ensure informed decision-making during the planning process. Alluding to the permitting process as the place to resolve outstanding issues does not satisfy the requirements of the planning process.

[31] **Section 4.5.8.4, Page 4-57.** The plan needs to clarify what the phrase "remain steady" through 2060 means. Does this mean that there will be no drop in aquifer levels due to this

increased volume of pumping over the planning horizon? If so, this needs to be quantified and included in this discussion.

[32] **Section 4.5.8.2, Page 4-57.** The values of water available in Table 4.37 do not appear to match the values previously indicated in Table 3.9 (page 3-56). For instance, here 35,529 ac-ft/yr are shown to be available in Webb Co. while the Table 3.9 figure, based on a water level decline of 100 ft on average throughout the county, was 3,000 ac-ft/yr.

[33] **Section 4.5.8.4, Page 4-58.** This section states that there may be a water level decline in the "deeper zones" of the Gulf Coast Aquifer. It is unclear as to the meaning of this qualification of the potential impacts. It may imply that the effects are of limited geographic extent (areas of aquifer with deep extent). It may also imply that the effects are removed from the surface and thus will not affect existing wells or the baseflows of streams and small springs or seeps. A more thorough explanation is necessary. In addition there should be a portrayal of the actual decline rate over time. This statement is also potentially in conflict with "remain steady" if the implied meaning of that phrase is constancy of water levels.

The plan states in **Section 3.5.1.2** that due to lack of use, the Gulf Coast aquifer in the region is considered full. Since aquifers are dynamic systems, there is outflow from the system, in the form of springs, loss to rivers and streams, and loss to other aquifer formations. So an increase in withdrawals from the system will impact the aquifer dynamics. The plan needs to address these potential impacts.

[34] **Section 4.5.8.4, Page 4-58.** The plan does not include a discussion of how increased groundwater production would impact the small springs in the region that provide water for livestock and wildlife (as described on Page 1-29).

[35] **Section 4.5.8.4** The IPP states on page 3-39 that the Arroyo Colorado is sustained in part by groundwater seepage, but there is no discussion of the potential loss of this source here.

[36] **Drought Management Measures**. As required by 357.7 (a)(7)(B) of TWDB's rules, drought management is a water management strategy that must be evaluated. That provision, along with Section 16.053 (h)(7)(B) also requires that drought management be <u>included</u> as a water management strategy for each entity required to prepare a drought management plan pursuant to Section 11.1272 of the Water Code. Drought management does not appear in Table 4-2. Although the planning group may decide, provided it documents the basis for that decision, not to include drought management as a water management strategy beyond those measures specifically required by Section 11.1272, it must include at least the Section 11.1272 level of drought management as a water management strategy. SB2 made inclusion of drought management measures at least at the level required by Section 11.1272 a mandatory prerequisite for approval by TWDB of a regional water plan. See Tex. Water Code Ann. § 16.053 (h)(7)(B). The initially prepared plan does not comply with that requirement. For each entity required to prepare a drought contingency plan pursuant to Section 11.1272 – all three of the municipal WUGs identified with needs in the region - the water plan must include a water management strategy reflecting the drought period savings from that drought plan.

CHAP. 5, IMPACTS OF WATER MANAGEMENT STRATEGIES ON KEY PARAMETERS OF WATER QUALITY AND IMPACTS OF MOVING WATER FROM RURAL AND AGRICULTURAL AREAS

[37] **Table 5.1, Page 5-2.** The impacts listed in this table are confusing. For example, the impacts listed for "additional groundwater" are not impacts that one would ordinarily associate with increased production of groundwater. Further explanation is needed.

[38] **Section 5.2, Page 5-4.** The discussion and associated report (Socioeconomic Impacts of Unmet Water Needs in the Rio Grande Water Planning Area) do not fulfill the requirements of §357.7 (a)(8)(G), for which this chapter is titled. The requirements call for an analysis of the impacts of moving water from rural and agricultural areas, not for an analysis of the impacts of unmet water needs in the region. The required analysis should be provided.

CHAP. 6, CONSOLIDATED WATER CONSERVATION & DROUGHT MANAGEMENT RECOMMENDATIONS OF THE REGIONAL WATER PLAN

[39] **Section 6.1, Page 6-2.** This section includes a good list of conservation strategies. However, although those strategies can help to minimize the adverse effects of droughts and help stretch water supplies, they won't help prevent a drought and the text should be rephrased. More significantly, however, the measures won't accomplish anything unless they are implemented and the initially prepared plan appears to lack any recommendation for their implementation.

[40] **Section 6.4, Page 6-6.** Need to replace the links "Word perfect" and "PDF" in this section with the actual addresses. The initially prepared plan does not appear to include actual model water conservation plans. We urge the planning group to include the required model plans.

CHAP. 7, LONG TERM PROTECTION OF THE STATE'S WATER RESOURCES, AGRICULTURAL RESOURCES, AND NATURAL RESOURCES

One of the key changes that SB 2 made to the water planning process was to create a specific statutory criterion mandating that a regional water plan may not be approved by TWDB unless it is shown to be consistent with long-term protection of the state's water resources, agricultural resources, and natural resources. The initially prepared plan devotes just over two pages to the discussion of that consistency. Although we certainly acknowledge that quality of discussion is more important than quantity, both are lacking here.

[41] **Section 7.1, Page 7-1.** Paragraph 4 implies that the IPP recommended Advanced Water Conservation as a WMS. This statement is not reflected in the Decision Documents contained in Appendix C and appears to conflict with the confusing statements on page 4-39, including the statement that "No WUGs expressed interest in pursuing advanced water conservation measures." Please rephrase this statement, along with the section on municipal water conservation, to accurately and clearly reflect how the Region addressed the issue of advanced water conservation.

[42] **Section 7.1, Page 7-2, Paragraph 2.** This section discusses optimizing the supply of water available from the Rio Grande as an important aspect of protecting the State's water resources. It

fails, however, to discuss the protection of groundwater resources. As mentioned in our comments related to Chapter 3, the group's decision of adopting a decline of groundwater levels in the region of up to 100-feet over the next 50 years is in direct conflict with the long-term protection of the State's water resource. We urge the planning group to revisit this issue and select a groundwater management strategy that provides for long-term protection of the aquifers and will not be detrimental to the communities that are becoming more reliant on groundwater withdrawals to meet their growing water demands.

[43] **Section 7.3** We commend the Region for acknowledging, in this section, that the issue of environmental flow maintenance in the Rio Grande is a concern. We urge the planning group to extend that recognition to the Arroyo Colorado and all of the region's estuaries. There are several strategies proposed in Chapter 4 (e.g., conversion of irrigation rights, reuse of wastewater) that have the potential to alter flows in the Rio Grande and Arroyo Colorado. These would also affect freshwater inflows to the Rio Grande mouth and the lower portion of the Laguna Madre, both of particular importance in the planning area. We believe more complete analysis and consideration, particularly of impacts to those inflows, is necessary in order to have a truly comprehensive regional water plan and to demonstrate compliance with applicable requirements.

Among the most pertinent of those requirements are the following:

- Water Code § 16.053(h)(7)(C), a new requirement for this round of planning. It requires the Texas Water Development Board (TWDB) to affirmatively determine, as a prerequisite to approving a regional water plan, that the plan is "consistent with long-term protection of the state's ... natural resources..."
- 31 TAC §§ 357.5(l) and 357.7(a)(1)(L), TWDB rules that direct planning groups to "consider environmental water needs *including instream flows and bay and estuary inflows*" and to identify threats to natural resources due to water quantity problems.
- 31 TAC § 357.7 (a)(8)(A)(ii), a new TWDB rule for this round of planning that requires RWPGs to include in their evaluation of water management strategies a *quantitative reporting* of environmental factors, including effects on environmental water needs.

In October of 2004, the National Wildlife Federation (NWF) released a report called *Bays in Peril: A Forecast for Freshwater Inflows to Texas Estuaries*. In that report, future freshwater inflows to the major estuaries were estimated based on increased use levels and the future inflows were then assessed against biologically relevant criteria[5] to forecast likely ecological impacts. We believe the methods used in the NWF analysis would provide useful information for helping to meet regulatory requirements for consideration of potential impacts to the estuaries of the Region.

In a letter to Region M in January of this year, NWF explained that the Lower Laguna Madre and Rio Grande were not included in NWF's original analyses due to incomplete status of a water availability model (WAM) for the Rio Grande and other technical issues. Since the release of the NWF report, the Rio Grande WAM has been completed.

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[5] Criteria based on states series of freshwater inflows studies such as Pulich Jr., W., J. Tolan, W. Y. Lee, and W. Alvis, 2002. *Freshwater Inflow Recommendation for the Nueces Estuary*. Texas Parks and Wildlife Department.

NWF has proposed to work cooperatively with the Region and its consultants to devise a representation of future inflows that reflects anticipated levels of water use and reuse and wastewater discharge with implementation of the regional water plan[6]. We support that effort and acknowledge that discussions are under way to accomplish that result. Our understanding is that, instead of the standard analysis used in *Bays in Peril* which assumed full use of existing permits and 50% reuse of wastewater, NWF and representatives of the planning group would jointly produce an analysis that looks at the water usage levels, including potential wastewater reuse or other new projects, the planning group considers most likely for 2060 conditions. Flow changes at both the mouth of the Rio Grande and inflow points for the Lower Laguna Madre would be assessed. Our belief is that the inclusion of such an analysis in the regional plan would substantially satisfy new requirements in this round of planning for "… quantitative assessments of environmental factors" as they relate to consideration of impacts to freshwater inflows and would provide information needed for a meaningful assessment of consistency of the regional plan with long-term protection of the state's natural resources.

An outline of NWF's proposed approach for accomplishing the joint evaluation is attached to this comment letter.

[44] **Section 7.3, Page 7-3.** This section includes a discussion of the potential for including environmental flows in the Rio Grande as a separate WUG in the next round of planning. We strongly endorse this concept and encourage the planning group to examine this strategy carefully. Recognizing environmental flows as an actual need to be planned for would allow for a more meaningful approach to actually ensuring reasonable estuary flows in the future.

[45] **Section 7.3** This section needs to address the potential impact that increased groundwater pumping and removal of water from storage may have on the small springs across the region, mentioned on Page 1-29, that support livestock and wildlife.

CHAP. 8, UNIQUE STREAM SEGMENTS/RESERVIOR SITES/LEGISLATIVE RECOMMENDATIONS

[46] **Section 8.1, Page 8-1.** It is disappointing to see that the Planning Group has again declined to recommend any streams for designation as unique stream segments. The explanation for not recommending such designations should be expanded. The initially prepared plan merely states: "a designation could cause that segment to be more susceptible to such issues as environmental flows and water quality issues upstream of the designation." Is the planning group saying that protection of environmental flows and water quality in those segments would be a bad thing? Further clarification would be helpful. Despite the lack of recommendations, we appreciate the inclusion of information in the plan about the segments considered for possible recommendation.

[47] **Section 8.1, Page 8-1.** Please correct the reference in the first paragraph from the "North East Texas" region to the Rio Grande Region.

[48] **Appendix C.** Unnumbered table titled "Water Supply and Demand Analysis." In each of the various entries for individual WUGs (e.g., Brownsville, Weslaco, etc.) there is a line labeled

[6] The original analysis used a standard TCEQ water availability model (WAM) run for the Texas rivers to forecast inflows to estuaries if all the existing water permits were fully used and if reuse of wastewater were increased to 50%.

"Advanced Water Conservation" in the water demand calculation portion of the sheet. The savings are actually just the accounting for automatic savings of the Plumbing Fixtures Act as part of the TWDB demand projections (as discussed above) and should be identified as such.

[50] **Appendix C** Unnumbered table titled "Water Supply and Demand Analysis." In the entry for the City of Brownsville, the water supply yield of the Brownsville Weir and Reservoir is erroneously given as 40,000 ac-ft/yr. As stated on page 4.53 of the IPP, the yield is 20,643 ac-ft/yr.

Thank you for your consideration of these comments and please feel free to contact us if you have any questions. We look forward to a continuing positive dialogue with the planning group during this and future planning cycles.

Sincerely,

Myron J Hess — Mary E. Kelly — Ken Kramer

Myron Hess	Mary Kelly	Ken Kramer
National Wildlife Federation	Environmental Defense	Sierra Club, Lone Star Chapter

cc: Robert Flores, Region M Liaison, TWDB
Kevin Ward, TWDB
Cindy Loeffler, TPWD
Bill Norris, NRS Consulting Engineers

ATTACHMENT I
SUMMARY OF PROPOSAL BY NATIONAL WILDLIFE FEDERATION FOR PROCESS FOR JOINT EVALUATION OF FRESHWATER INFLOW IMPACTS

NWF proposes a three-step process as outlined below.

Step 1 –Predict Freshwater Inflows for Baseline(s) and with Regional Plan Using WAMs

Using the Rio Grande WAM and the lower portion of the Nueces-Rio Grande coastal basin WAM, we would jointly predict monthly inflows to the Lower Laguna Madre and mouth of the Rio Grande estuaries for 'baseline' conditions and for future conditions with the regional water plan in place. Proposed baselines for comparative purposes are: a) the WAMs "natural" inflows, representing conditions prior to significant alteration and b) "present use" conditions. The proposed future condition scenario would portray conditions with the regional water plan fully implemented in all regards.

Step 2 – Perform Ecologically-Based Freshwater Inflow Assessments

For the freshwater inflows calculated for each scenario above, we would perform tabulations for the two ecologically-based assessments as used in the *Bays in Peril* report. For that original effort, the two ecologically-based assessments relied, in part, upon the freshwater inflow recommendations of the Texas Parks & Wildlife Department (TPWD) and the TWDB[1] for each estuary. The first assessment focuses upon spring / early summer freshwater inflow pulses. The second assessment is focused on six-month periods of continuous low flows falling within the months of March through October (which represent a time of significant biological activity in the estuaries).

The Lower Laguna Madre already has in place a set of freshwater inflow criteria which allow us to perform the same type of analysis as in the Bays in Peril report for the state's other estuaries. The Rio Grande however, does not have such criteria. In this case we will have to consult with Texas Parks and Wildlife Department to develop some 'place holder' criteria for use in our analysis.

Step 3 – Present the Results in Final Regional Water Plan

Finally, a summary of the two ecologically-based assessments for the each of the scenarios would be developed for inclusion in the final regional water plan. This would include appropriate graphics and / or tables to summarize the key findings. The preferred approach, if those analyses showed troubling results, would be to consider different combinations of water management strategies in an attempt to meet water needs while avoiding large-scale impacts to inflows. However, given the current timing constraints, the regional water planning group may not be able to consider such alternatives during this round of planning. In that event, we would hope subsequent action would be taken to modify the plan to minimize such impacts. If the analyses do not predict problems then the information would be used to demonstrate a careful consideration of impacts and of consistency with long-term protection of natural resources.

[1] e.g., TPWD & TWDB, "Freshwater Inflow Recommendation for the Nueces Estuary of Texas" Sept. 2002.

Table M-IPP-1 – Calculation of additional savings through municipal water efficiency measures for Water User Groups with net water use >140 gpcd at the 2060 time frame with

		Region M IPP proposed water use and water efficiency data, Year 2060						environmental community proposed savings, Year 2060		
Water User Group (WUG) name	Year 2000 use rate (gpcd)	Population[a]	Portion of region (%)	IPP total demand of WUG (ac-ft/yr)	use rate (gpcd) [includes plumbing code]	addtnl. water efficiency sav. (ac-ft/yr)	net water use rate with efficiency measures (gpcd)	use rate[b] (gpcd)	revised total demand (ac-ft/yr)	addtl. savings (ac-ft/yr)
top 10 population centers										
LAREDO	200	650,317	17.0%	136,948	188	0	188	140	101,983	34,965
BROWNSVILLE	229	357,828	9.4%	86,577	216	0	216	140	56,115	30,462
NORTH ALAMO WSC	96	350,473	9.2%	33,369	85	0	85	85	33,369	-
MCALLEN	205	275,322	7.2%	59,213	192	0	192	140	43,176	16,037
HIDALGO CO.-OTHER	115	253,592	6.6%	29,542	104	0	104	104	29,542	-
EDINBURG	119	179,517	4.7%	21,717	108	0	108	108	21,717	-
MISSION	149	171,790	4.5%	26,363	137	0	137	137	26,363	-
PHARR	132	150,291	3.9%	20,202	120	0	120	120	20,202	-
SAN JUAN	85	129,327	3.4%	10,720	74	0	74	74	10,720	-
HARLINGEN	156	116,389	3.0%	18,643	143	0	143	140	18,252	391
subtotals		**2,634,846**	**68.9%**	**443,294**				0	**361,439**	**81,855**

Table M-IPP-1, cont'd – Calculation of additional savings through municipal water efficiency measures for Water User Groups with net water use >140 gpcd at the 2060 time frame with

		Region M IPP proposed water use and water efficiency data, Year 2060						environmental community proposed savings, Year 2060		
Water User Group (WUG) name	Year 2000 use rate (gpcd)	Population[a]	Portion of region (%)	IPP total demand of WUG (ac-ft/yr)	use rate (gpcd) [includes plumbing code]	addtnl. water efficiency sav. (ac-ft/yr)	net water use rate with efficiency measures (gpcd)	use rate[b,c] (gpcd)	revised total demand (ac-ft/yr)	addtl. savings (ac-ft/yr)
additional high water use centers (basic gpcd>250)										
S. PADRE ISLAND[c]	704	7,392	0.2%	5,722	691	0	691	521	4,315	1,407
VALLEY MUD #2	618	1,246	0.0%	843	604	0	604	338	472	371
WILLACY CO.-OTHER	501	384	0.0%	209	486	0	486	274	118	91
LA GRULLA_STARR	474	1,211	0.0%	624	460	0	460	259	352	272
PORT ISABEL	451	7,520	0.2%	3,681	437	0	437	247	2,079	1,602
HIDALGO CO. MUD #1	293	18,487	0.5%	5,860	283	0	283	160	3,320	2,540
LAGUNA MADRE WD	271	26,416	0.7%	7,812	264	0	264	148	4,389	3,423
PALM VALLEY	268	1,959	0.1%	555	253	0	253	147	322	233
subtotals		**64,615**	**1.7%**	**25,306**				0	**15,367**	**9,939**

notes: a) first set is top ten WUGs in Region M, based on 2060 population, second set is other WUGs with smaller population but IPP-proposed water use greater than 250 gpcd in 2060. b) proposed water use rate is based on 1% per year reduction from year 2000 water use, but no less than 140 gpcd unless the WUG was already at that level in year 2000. c) because of the high influence of tourism on water use for South Padre Island, the revised water use rate is based on a reduction of only one-half percent per year.

Responses to Public Comments

Comment #1

1. Environmental impacts were evaluated quantitatively and supplemental data was collected by NWF.

Comment #2

1. Palm Valley population and water demand data will be taken into consideration in the next round of regional planning.
2. All references to Palm Valley Estates were noted. Abolition of Palm Valley Estates Utility District will take effect in the next round of regional planning.
3. Palm Valley's Drought Contingency plan is noted in the final plan.
4. Water demand data will be evaluated to aide the next round of regional planning.

Comment #3

1. Brownsville Weir yield was corrected. Text reference error was corrected.

Comment #4

1. Advanced Water Conservation as a WMS was reevaluated and revised.
2. Should it be complete, the TPWD estuary study may be applied to specific projects in the next round of regional planning.
3. Environmental flows as a Water User Group is a policy recommendation.

Comment #5

1. Typos were corrected.

Comment #6

1. References were added.
2. Section 4.6.8 was deleted.
3. Environmental flows as a WUG is discussed as a policy recommendation
4. The text was revised.
5. The text was revised.
6. The text was revised.
7. The text was revised.
8. The text was revised.
9. Text was clarified in Section 1.3.4.
10. The text was revised.
11. Text was revised.
12. The text referenced on page 3-98 details the lower reach of the Rio Grande below the Falcon Dam. The referenced text on page 3-101 details the Laguna Madre. These are two different bodies of water with different ecosystems. Even though similarities can be drawn between the two, the Laguna Madre receives a bounty of freshwater inflows from the Arroyo Colorado and the effects of these inflows make the Laguna Madre unique.
13. It is a state requirement to prepare a drought contingency plan.

14. This comment will be taken into consideration in the next round of regional planning.
15. Environmental impacts were revised.
16. Environmental impacts were revised.
17. Environmental impacts were revised.
18. No existing text was changed.
19. Text in Section 6.5 was edited.
20. Not enough data exists to accurately assess environmental flows. However, fresh water in-flows are explained in Chapter 7.

Comment #7

1. Environmental impacts were evaluated quantitatively and supplemental data was provided by the NWF.
2. The misspelling has been corrected.
3. Description of stream segment was corrected.

Comment #8

See TWDB Comment Responses

Comment #9

1. The product will be researched in more detail for the next round of regional planning. No text in plan will be changed due to the comment.

Comment #10

1. El Morillo Drain is discussed as a policy recommendation.

Comment #11

1. The Watermaster Advisory Committee activities paragraph stated in the letter will be added in Chapter 8.
2. A statement stating that TCEQ should provide assistance to the Rio Grande RWPG as it reviews rules on converting water rights from one use to another and considers appropriate rule amendments if necessary will be added to policy recommendations in Chapter 8.

Comment #12

1. Incorporating good land stewardship will be taken into consideration when evaluating conservation strategies for the next round of regional planning.

Comment #13

1. An Executive Summary was included in the final draft.
2. An analysis of natural springs exists in Section 1.3. Our analysis shows that "There are no major springs that are extensively relied upon for water supply purposes."
3. The typo was corrected.
4. Text reflecting this comment was added in Section 1.6.

5. Chapter 7 discusses fresh water in-flows associated with each Water Management Strategy, including Acquisition of Rio Grande Water Rights.
6. Water demand projection text was revised.
7. Steam-electric water demand figures were provided by the TWDB. No change was made to the text.
8. No action needed.
9. No change has been made.
10. No action needed.
11. Table 3.6 references a combined Municipal and Industrial Surface Water Right total of 391,461 AF, which correlates to the text in Section 3.6.1.
12. The conversion rate of irrigation-to-municipal water rights has been added to Section 3.6.1
13. Acquisition of Rio Grande Water Rights through purchase, urbanization, and contract are included as WMSs. The sentence in question serves as backup information.
14. Environmental impacts were edited to reflect the comment.
15. A report by the NWF in Chapter 7 describes the effect of fresh water in-flows.
16. A report by the NWF in Chapter 7 describes the effect of fresh water in-flows.
17. The Advanced Water Conservation writeup and analysis was revised.
18. The Advanced Water Conservation writeup and analysis was revised.
19. The Advanced Water Conservation writeup and analysis was revised.
20. The Advanced Water Conservation writeup and analysis was revised.
21. The Advanced Water Conservation writeup and analysis was revised.
22. The Advanced Water Conservation writeup and analysis was revised.
23. The Advanced Water Conservation writeup and analysis was revised.
24. The Advanced Water Conservation writeup and analysis was revised.
25. The Advanced Water Conservation writeup and analysis was revised.
26. The Advanced Water Conservation writeup and analysis was revised.
27. The Advanced Water Conservation writeup and analysis was revised.
28. TCEQ permits are discussed in Section 4.5.5.
29. Text was added in Section 3.5 reflecting the impact to aquifer levels from an increase in the removal of groundwater.
30. A quantitative environmental analysis is included in the final draft.
31. The amount of groundwater available is detailed in Section 3.5.
32. Groundwater yields were revised to accurately reflect availability.
33. Chapter 3 explains the impacts and effects of groundwater drawdown.
34. Environmental impacts were revised.
35. Chapter 7 includes a report on the Arroyo Colorado in which the fresh water in-flows are analyzed.
36. Drought Management Measures are thoroughly analyzed in Chapter 6.
37. The majority of WMSs deal with the effects of urbanization. Table 5.1 reflects these effects.
38. Socioeconomic Impacts are provided by the TWDB.
39. The text was revised.
40. The actual addresses were included.
41. Advanced Water Conservation was revised.

42. There is currently not enough information to suggest that a 100 foot draw down is detrimental to the long-term protection of the State's water resources.
43. The Arroyo Colorado and all of the region's estuaries were included in Section 7.3.
44. No action needed.
45. There is currently not enough information to accurately reflect the impacts of groundwater drawdown on small springs.
46. No action needed.
47. The correction was made.
48. Advanced Water Conservation was revised.
49. Brownsville Weir and Reservoir yield was changed to 20,643 AF/yr.