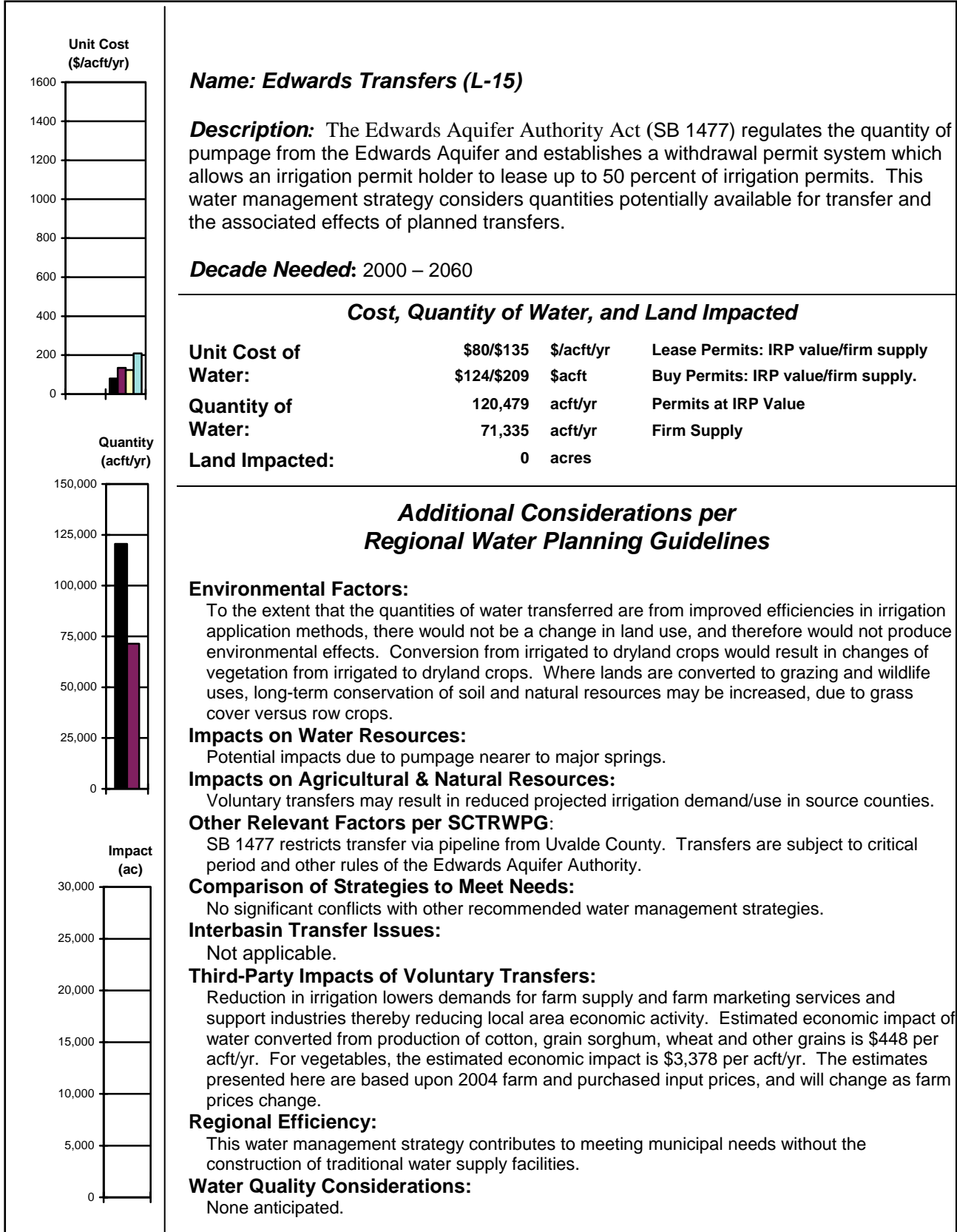


2006 South Central Texas Regional Water Plan Water Management Strategy Summary Sheet



4C.2 Edwards Transfers (L-15)

The purposes of this section are to: (1) estimate the quantity of Edwards irrigation water eligible and available for transfer to municipal and industrial use by purchase or lease, and (2) estimate potential impacts of transfers included in the 2006 Regional Water Plan upon the local economies of Uvalde, Medina, and Bexar Counties. This water management strategy is based upon the provisions of Senate Bill 1477 (SB 1477), 1993 Regular Session, Texas Legislature, as amended.

4C.2.1 Provisions for Purchase (or Lease) of Edwards Irrigation Water

SB 1477, Section 1.14, limits the quantity of water that can be withdrawn from the Edwards Aquifer in each calendar year for the period ending December 31, 2007 to no more than 450,000 acft, and for the period beginning January 1, 2008 to no more than 400,000 acft. Section 1.14, Subsection h, specifies that the Edwards Aquifer Authority shall implement and enforce water management practices, procedures, and methods to ensure that, not later than December 31, 2012, continuous minimum springflows at Comal and San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law.

Section 1.15 of SB 1477 provides that the Edwards Aquifer Authority shall manage withdrawals and points of withdrawal from the aquifer by granting permits, and Section 1.34 of the Act specifies the manner in which water rights may be transferred, as follows:

- “(a) Water withdrawn from the aquifer must be used within the boundaries of the authority.
- (b) The authority by rule may establish a procedure by which a person who installs water conservation equipment may sell the water conserved.
- (c) A permit holder may lease permitted water rights, but a holder of a permit for irrigation use may not lease more than 50 percent of the irrigation water rights initially permitted. The user's remaining irrigation water rights must be used in accordance with the original permit and must pass with transfer of the irrigated land.”

SB 1477, Section 1.16(e), provides that, “An existing irrigation user shall receive a permit for not less than 2 aft/yr for each acre of land the user actually irrigated in any one calendar year during the historical period.”

In accordance with provisions of SB 1477, the EAA has issued Initial Regular Permits (IRPs) for municipal, industrial, and irrigation water use. The total quantity permitted for municipal, industrial, and irrigation uses was 574,234 acft/yr (Table 4C.2-1). The total of the

unrestricted transfer potentials for the EAA six-county area is 443,022 acft/yr, of which 285,517 is in Bexar County, 51,744 acft/yr is in Medina County, and 73,400 acft/yr is in Uvalde County (Table 4C.2-1). Of the 443,022 acft/yr of “unrestricted” transferable water rights, the San Antonio Water System (SAWS) has acquired 38,382 acft/yr, leaving 404,640 acft/yr of remaining unrestricted transfer potential, and 131,212 acft/yr of remaining restricted transfer potential (Table 4C.2-1). In the case of “restricted” permits, only the quantity that is saved through irrigation water conservation can be transferred (i.e., that part of the 50 percent of the irrigation permit that by SB 1477 must remain with the land).

Under the provisions of the act allowing for transfer of “restricted” permits, as of June 2005, SAWS has participated in the installation of irrigation water conservation equipment through cost-sharing with the US Department of Agriculture’s Environmental Quality Incentives Program (EQIP). Under this irrigation water conservation program, center pivots for irrigation application were installed on approximately 6,000 acres that had previously been irrigated using the flooding application method. It has been estimated that this effort has resulted in about 2,000 acft/yr, of water conservation on the 6,000 acres, and SAWS has applied to the EAA for transfer of the 2,000 acre-feet of irrigation “restricted” permits to municipal and industrial permits.

For Bexar, Medina, and Uvalde Counties, the remaining unrestricted irrigation permit quantity that is potentially available for transfer to municipal and industrial uses is 122,946 acft/yr, and the restricted transfer potential is 128,744 acft/yr (Table 4C.2-1). When adjusted to the 400,000 acft/yr pumping cap and accounting for 15 percent reductions during critical periods, these quantities are 72,795 acft/yr and 76,228 acft/yr, respectively, for unrestricted and restricted permits (Table 4C.2-1).

In the 2006 Regional Water Plan, irrigation transfers are included to meet projected needs of 23 municipal water user groups, in 2010 of 64,312 acft/yr, increasing to 67,834 acft/yr in 2030, and to 71,335 acft/yr in 2060 (quantities are part of the 340,000 acft/yr of firm yield used in the development of the 2006 plan) (Table 4C.2-2). IRP value of permits needed to obtain these quantities of firm yield increase from 108,618 acft/yr in 2010 to 114,566 acft/yr in 2030, and 120,479 acft/yr in 2060 (Table 4C.2-2).

Table 4C.2-1.
Edwards Aquifer Water Use Permits by Purpose of Use by County
South Central Texas Region

County	Use Type	EAA Initial Regular Permits (acft/yr)	Unrestricted Transfer Potential ¹ (acft/yr)	SAWS Permanent Transfers ² (acft/yr)	Remaining Unrestricted Transfer Potential ³ (acft/yr)	400K Cap Drought Supply Equivalent ⁴ (acft/yr)	Remaining Restricted Transfer Potential ⁵ (acft/yr)	400K Cap Drought Supply Equivalent ⁴ (acft/yr)
Atascosa	Municipal	259	259	0	259	153	0	0
	Industrial	0	0	0	0	0	0	0
	Irrigation	2,897	1,449	0	1,449	858	1,449	858
	Subtotal	3,156	1,708	0	1,708	1,011	1,449	858
Bexar	Municipal	212,006	212,006	548	211,458	125,203	0	0
	Industrial	55,942	55,942	32,037	23,905	14,154	0	0
	Irrigation	35,137	17,569	4,574	12,995	7,694	17,569	10,402
	Subtotal	303,085	285,517	37,159	248,358	147,051	17,569	10,402
Comal	Municipal	8,930	8,930	0	8,930	5,287	0	0
	Industrial	10,227	10,227	0	10,227	6,055	0	0
	Irrigation	1,195	598	0	598	354	598	354
	Subtotal	20,352	19,755	0	19,755	11,697	598	354
Guadalupe	Municipal	0	0	0	0	0	0	0
	Industrial	253	253	0	253	150	0	0
	Irrigation	0	0	0	0	0	0	0
	Subtotal	253	253	0	253	150	0	0
Hays	Municipal	7,265	7,265	0	7,265	4,302	0	0
	Industrial	2,959	2,959	0	2,959	1,752	0	0
	Irrigation	845	423	0	423	250	423	250
	Subtotal	11,069	10,647	0	10,647	6,304	423	250
Medina	Municipal	6,126	6,126	0	6,126	3,627	0	0
	Industrial	1,258	1,258	0	1,258	745	0	0
	Irrigation	88,720	44,360	940	43,420	25,709	44,360	26,265
	Subtotal	96,104	51,744	940	50,804	30,081	44,360	26,265
Uvalde	Municipal	4,626	4,626	0	4,626	2,739	0	0
	Industrial	1,959	1,959	0	1,959	1,160	0	0
	Irrigation	133,630	66,815	284	66,532	39,393	66,815	39,561
	Subtotal	140,215	73,400	284	73,117	43,292	66,815	39,561
Bexar, Medina, and Uvalde Counties Subtotals								
	Municipal	222,758	222,758	548	222,210	131,569	0	0
	Industrial	59,159	59,159	32,037	27,122	16,059	0	0
	Irrigation	257,487	128,744	5,798	122,946	72,795	128,744	76,228
	Subtotal	539,404	410,661	38,382	372,278	220,423	128,744	76,228
Edwards Aquifer Area Totals								
	Municipal	239,212	239,212	548	238,664	141,311	0	0
	Industrial	72,598	72,598	32,037	40,561	24,016	0	0
	Irrigation	262,424	131,212	5,798	125,415	74,257	131,212	77,690
	EAA Total	574,234	443,022	38,382	404,640	239,585	131,212	77,690

¹ Calculated as 50% of irrigation and 100% of municipal & industrial Initial Regular Permit amounts.

² Provided by SAWS in March 2004.

³ Unrestricted transfer potential net of SAWS permanent transfers.

⁴ Calculated as 85% of transfer potential after pro-ration of Initial Regular Permits to a 400,000 acft/yr cap.

⁵ Maximum amount potentially transferable with conversion of base to unrestricted irrigation groundwater by installation of water conservation equipment.

**Table 4C.2-2.
Edwards Aquifer Water Transfers by County
South Central Texas Region**

Entity	County	Year					
		2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lytle	Atascosa	196	207	217	224	234	243
Subtotal		196	207	217	224	234	243
Alamo Heights	Bexar	515	578	580	576	590	614
Atascosa Rural WSC	Bexar	561	732	884	1,011	1,121	1,233
Kirby	Bexar	299	298	301	295	307	328
Lackland AFB (CDP)	Bexar	857	833	809	785	769	769
Shavano Park	Bexar	499	515	527	536	548	560
Universal City	Bexar	141	449	708	658	634	634
Water Ser Inc (Apex Water Ser)	Bexar	908	1,145	1,381	1,596	1,798	2,015
Subtotal		3,780	4,550	5,190	5,457	5,767	6,153
Garden Ridge	Comal	115	171	234	298	364	436
Subtotal		115	171	234	298	364	436
Crystal Clear WSC (Meet part of Need)	Guadalupe	1,200	1,400	1,400	1,400	1,400	1,400
Green Valley SUD (Meet part of Need)	Guadalupe						
Subtotal (Crystal Clear & Green Valley)		1,200	1,400	1,400	1,400	1,400	1,400
County Line WSC (Meet Part of Need)	Hays	1,000	1,000	1,000	1,000	1,000	1,000
Subtotal		1,000	1,000	1,000	1,000	1,000	1,000
Castroville	Medina	274	337	396	448	502	555
East Medina SUD	Medina	0	0	95	184	278	372
Hondo	Medina	804	1,021	1,225	1,395	1,568	1,737
La Coste	Medina	96	113	130	142	156	172
Natalia	Medina	198	242	283	318	353	387
Yancey WSC	Medina	577	758	925	1,073	1,214	1,348
County-Other	Medina	180	507	799	1,058	1,326	1,567
Subtotal		2,129	2,978	3,853	4,618	5,397	6,138
Sabinal	Uvalde	139	135	130	125	121	121
Uvalde	Uvalde	3,793	3,830	3,850	3,854	3,856	3,884
Subtotal		3,932	3,965	3,980	3,979	3,977	4,005
Subtotals		12,352	14,271	15,874	16,976	18,139	19,375
SAWS		48,000	48,000	48,000	48,000	48,000	48,000
BMWD		3,960	3,960	3,960	3,960	3,960	3,960
TOTAL Firm Supply (340,000 acft/yr)		64,312	66,231	67,834	68,936	70,099	71,335
IRP Value Permits Needed*	1.6889	108,618	111,859	114,566	116,428	118,392	120,479

*IRP value of permits needed is 574,234/340,000 times firm supply needed.

Given the quantities of transfers, as shown in Table 4C.2-2, the quantities of projected irrigation surpluses, irrigation water conservation potentials, and quantities of irrigation water conservation needed to meet projected irrigation needs in Bexar, Medina, and Uvalde Counties (Table 4C.2-3), there is a projected transfer of irrigation water to municipal and industrial uses in

Table 4C.2-3.
Summary of Sources of Edwards Aquifer Water for Transfer
South Central Texas Region

Source of Supply	Year					
	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Irrigation Surpluses						
Bexar County	6,853	7,446	7,447	7,999	8,527	9,034
Medina County	-30	2,113	4,163	6,128	8,010	9,814
Uvalde County	24,246	26,438	28,534	30,549	32,484	34,344
Subtotal	31,069	35,997	40,144	44,676	49,021	53,192
Irrigation Water Conservation Potentials						
Bexar County	2,366	2,366	2,366	2,366	2,366	2,366
Medina County	8,392	8,392	8,392	8,392	8,392	8,392
Uvalde County	8,442	8,442	8,442	8,442	8,442	8,442
Subtotal	19,200	19,200	19,200	19,200	19,200	19,200
Irrigation Water Conservation to Meet Needs						
Bexar County	529	529	529	529	529	529
Medina County	4,651	2,887	1,200	0	0	0
Uvalde County	0	0	0	0	0	0
Subtotal	5,180	3,416	1,729	529	529	529
Total Available						
(Surpluses + Cons Potential - Cons to Meet Needs)	45,089	51,781	57,615	63,347	67,692	71,863
Firm Supply Transfers	64,312	66,231	67,834	68,936	70,099	71,335
Change in Supply for Irrigation *	-19,223	-14,450	-10,219	-5,589	-2,407	528
Projected Irrigation Demand						
Bexar County	15,273	14,628	14,010	13,417	12,850	12,306
Medina County	54,450	52,179	50,005	47,922	45,927	44,015
Uvalde County	55,791	53,609	51,513	49,498	47,563	45,703
Subtotal	125,514	120,416	115,528	110,837	106,340	102,024
Transfer as Percent of Projected Irrigation Demand	15.32%	12.00%	8.85%	5.04%	2.26%	0.52%
* Irrigation surpluses plus irrigation conservation potentials minus irrigation conservation to meet projected needs minus Firm Supply Transfers equals net quantities of transfers from irrigation to municipal uses.						

Bexar, Medina, and Uvalde Counties of 19,223 acft/yr in 2010, 10,219 acft/yr in 2030, 2,407 acft/yr in 2050, and surplus of 528 acft/yr in 2060 (Table 4C.2-3); e.g.; the Edwards transfer water management strategies of the 2006 Regional Water Plan result in transfers of projected irrigation water surpluses, a part of the quantities of irrigation water conservation, and water that was projected to be used in irrigation in the quantities shown in Table 4C.2-3. The quantity that would be transferred from irrigation uses is 15.32 percent of the projected irrigation demand in 2010, 8.85 percent in 2030, and 2.26 percent in 2050 (Table 4C.2-3). In 2060, there is an estimated 528 acft/yr of unused irrigation water that is not projected to be transferred (Table 4C.2-3).

4C.2.2 Edwards Aquifer Irrigation Water Supply and Water Cost Information

In the Edwards Aquifer area, irrigation with water from the aquifer and from the Medina Lake System supplements annual precipitation, which averages 25 inches in the west and 28 inches in the east.¹ The quantity of irrigation water applied per acre can vary from a few inches when precipitation is above average to as much as 42 inches on some high water demand crops during drought years.

Water from the Edwards Aquifer is used in Bexar, Medina, and Uvalde Counties for irrigation of crops such as corn, cotton, grain sorghum, wheat, vegetables, and forage for livestock. Although cotton, corn, grain sorghum, wheat and forage for livestock, can be produced in Bexar, Medina, and Uvalde Counties without irrigation, the yields per acre are only about one-third to one-half those on irrigated acres (Table 4C.2-4). In the case of vegetables and oil seed crops, dryland production is not possible in most years. Thus, without a supply of irrigation water, the total value of agricultural commodities marketed in this part of the South Central Texas Region would be reduced, and agricultural marketing establishments' business levels could be lowered.

Average annual irrigated acreage in the Bexar, Medina, and Uvalde Counties area for the 1996 through 2000 period was approximately 104,022 acres, with average annual irrigation water use of 170,746 acft, of which approximately 122,100 acft/yr was from the Edwards Aquifer (Table 4C.2-5).² Of total water use of 170,746 acft/yr, approximately 7.9 percent was

¹ Texas Department of Water Resources, "Climatic Atlas of Texas," LP-192, December 1983.

² "Edwards Aquifer Authority Hydrologic Data Report for 2003," Edwards Aquifer Authority, San Antonio, Texas, June 2004.

applied to cotton, 8.3 percent was used for the production of Grain Sorghum, 48.62 percent was used to grow corn, 6.19 percent was used to produce wheat and other small grains, 11.23 percent was used to grow hay, forage, and pasture, 11.67 percent was used to produce vegetables, and 6.09 percent was used for all other crops (Table 4C.2-5).

**Table 4C.2-4
Dryland and Irrigated Crop Yields*
Bexar, Medina and Uvalde Counties
South Central Texas Region**

Crop	Dryland	Irrigated
Corn	60 bu/acre	115 bu/acre
Cotton	350 lbs/acre	960 lbs/acre
Grain Sorghum	3,000 lbs/acre	5,000 lbs/acre
Guar	800 lbs/acre	1,850 lbs/acre
Peanuts	**	3,500 lbs/acre
Sesame	**	1,250 lbs/acre
Winter Wheat/Grain	20 bu/acre	40 bu/acre
Winter Wheat/Grazing	45 days/acre	90 days/acre
Spring Wheat/Grain	10 bu/acre	50 bu/acre
Beets/Processing	**	14 tons/acre
Cabbage	**	16 tons/acre
Cantaloupe	**	300 cartons/acre
Carrots/Fresh	**	12 tons/acre
Carrots/Processing	**	14 tons/acre
Cucumbers/Fresh	**	6.25 tons/acre
Cucumbers/Pickles	**	8 tons/acre
Lettuce	**	12.5 tons/acre
Onions	**	18.75 tons/acre
Spinach/Fresh	**	450 bu/acre
Spinach/Processing	**	11 tons/acre
Forage		
Coastal Bermuda/Pasture	200 days/acre***	600 days/acre***
Coastal Bermuda/Hay	**	10 tons/acre
Forage Sorghum/Grazing	**	600 days/acre***
Forage Sorghum/Hay	4.5 tons/acre	10 tons/acre
*Source: "Texas Crop Enterprise Budgets, Southwest Texas District," Peña, Jose G.; Texas Agricultural Extension Service, Texas A&M University System; Uvalde, Texas, 1997. The yields per acre listed here are indications of potential yields for high level farm and ranch management and favorable weather conditions, as opposed to projections of yields for average conditions.		
** Not produced dryland.		
*** May stock more than one animal unit per acre.		

**Table 4C.2-5.
Estimated Differences between Dryland and Irrigated Income and Costs of Purchased Inputs*
Bexar, Medina, and Uvalde Counties
South Central Texas Region**

Major Crop Irrigated	Acres Irrigated 1996-2000** Average	Percent of Total Acres (%)	Irrigation Water Applied** (acft) (acft/acre)	Total Income per Acre		Purchased Inputs per Acre		Difference per Acre		Region Difference Total		Irrigation Water Used (%)
				Dryland (dollars)	Irrigated (dollars)	Dryland (dollars)	Irrigated (dollars)	Income (dollars)	Inputs (dollars)	Income (dollars)	Inputs (dollars)	
Field Crops												
Cotton	7,717	7.42	13,503 (1.75)	270	811	248	590	541	342	4,175,005	2,639,282	7.91
Grain Sorghum	10,788	10.37	14,168 (1.31)	142	308	122	207	166	85	1,790,742	916,946	8.30
Corn	48,060	46.20	83,017 (1.73)	165	342	142	266	177	124	8,506,620	5,959,440	48.62
Wheat & Other Grain	9,796	9.42	10,570 (1.08)	140	220	88	157	80	69	783,680	675,924	6.19
Subtotal	76,361	73.41	121,258 (1.59)	169	369	143	276	200	133	15,256,047	10,191,592	71.02
Hay, Forage & Past ¹	10,431	10.03	19,180 (1.84)	167	553	174	457	386	283	4,026,212	2,951,860	11.23
Subtotal (Field & Forage)	86,792	83.43	140,438 (1.62)							19,282,258	13,143,452	82.25
Vegetables												
Shallow Rooted ²	6,387	6.14	9,472 (1.48)	***	3,560	***	2,944	3,560	2,944	22,737,008	18,802,739	5.55
Deep Rooted ³	6,849	6.58	10,446 (1.53)	***	1,068	***	760	1,068	760	7,314,305	5,204,936	6.12
Subtotal Vegetables	13,236	12.72	19,918 (1.50)	***	772	***	264	2,271	1,814	30,051,313	24,007,675	11.67
All Other Crops	3,995	3.84	10,390 (2.60)	***		***		772	264	3,084,294	1,054,733	6.09
Total for All Crops	104,022	100.00	170,746 (1.64)							52,417,866	38,205,860	100.00

* Source: "Texas Crop Enterprise Budgets, Southwest Texas District," Peña, Jose G.; Texas Agricultural Extension Service, Texas A&M University System, Uvalde, Texas, 2004. All income and input dollars are in 2004 prices.

** Annual Irrigation Surveys, Texas Water Development Board, Austin, Texas. For the 1996 through 2000 period, according to the EAA Hydrologic Data Report of 3003, average annual irrigation water use from the Edwards Aquifer was 122,100 acre-feet per year. The total Edwards Aquifer water use for Bexar, Medina, and Uvalde Counties in year 2000 was reported at 78,600 acre-feet.

¹ Coastal Bermuda, Alfalfa, and Forage Sorghum.

² Shallow Rooted Vegetables (cabbage, lettuce, onions, and spinach).

³ Deep Rooted Vegetables (beets, cantaloupes, carrots, and cucumbers).

*** Not produced dryland.

4C.2.3 Regional Economic Effects of Edwards Irrigation Water Transfer

Any reduction in irrigation that would occur due to lease or sale of Edwards Aquifer irrigation permits would result in reduced value of production of crops, that in turn would result in reduced demand for agricultural production inputs and agricultural marketing and processing services, and of course, farm incomes would be lower. Reduced irrigation would result in lower irrigated agriculture purchases of production inputs from other sectors of the economy, including seed, fertilizer, herbicides, insecticides, fuel, machinery, equipment, labor, transportation, and financial and business services. In addition, of course, there would be less grain, fiber, and vegetables sold to the agriculture processing sectors, thereby reducing business for the agricultural marketing, food and fiber processing, transportation, storage, warehousing, and related non-farm sectors of the economy. These economic impacts associated with reductions in irrigation are estimated below.

The sale or lease of irrigation permits for which the water is used to produce cotton, grain sorghum, and wheat and other grain, with the acreage affected being converted to dryland production of the same crops, would reduce gross farm income by \$200 per acre and reduce purchased inputs by \$133 per acre of irrigated land for which the irrigation water is sold or leased. On a per acre-foot of water basis, the farm income effect is \$126, and the purchased inputs effect is \$84. (The computations are from data in Table 4C.2-5 and are as follows: regional difference between irrigation and dryland income for cotton, grain sorghum, corn and wheat and other grains is \$15,282,047; regional difference in purchased inputs is \$10,191,592, and quantity of irrigation water is 121,258 acft. $\$15,282,047 \div 121,258 = \126 per acft for the income effect, and $\$10,191,592 \div 121,258 = \84 for the purchased inputs effects.)

The total output multiplier for crop production in the region is estimated at 2.24, which means that for each dollar of crop value at the farm, the total business effect within the area is \$2.24.³ Given this multiplier, the impact of a change of 1 acft in irrigation water use to produce cotton, grain sorghum, and wheat and other grains has an estimated economy-wide business effect of \$448 per acft/year ($\200 per acft \times 2.24 = \$448).

³ Unpublished Output Multipliers; Lonnie L. Jones, Ph.D., Department of Agricultural Economics, Texas A&M University, College Station, Texas, April 1994.

In the case of vegetable production, the gross income effect per acft of water used is \$1,508 per year (Table 4C.2-5), resulting in an estimated economy-wide business effect of \$3,378 per acft/yr ($\$1,508 \text{ per acft} \times 2.24 = \$3,378$), of which \$1,508 is the farm value and \$1,870 is the off-farm gross business value.

The estimated farm income effect of the projected transfer of water from irrigation to municipal and industrial uses is estimated at \$2.42 million per year in 2010, \$1.29 million per year in 2030, and \$0.30 million per year in 2050 (Table 4C.2-6). The reduction in value of purchased inputs in 2010 is \$1.61 million per year, \$0.89 million per year in 2030, and \$0.20 million per year in 2050 (Table 4C.2-6). The total economic impact of the transfers is estimated at \$5.42 million annually in 2010, \$2.88 million in 2030, and \$0.68 million annually in 2050 (Table 4C.2-6).

Recently, sales and leases of irrigation IRPs for municipal and industrial use have been made, with lease rates for 5 to 20 year terms at rates of \$77/acft/yr to \$83/acft/yr. In 2004, fee simple purchase price of Edwards IRPs has been in the range of \$1,650 to \$1,750 per acre foot.⁴ An IRP lease price of \$80/acft/yr is equivalent to a firm supply lease price of \$135/acft/yr ($\$80 \times 574,234/340,000$). Similarly, an IRP purchase price of \$1,700/acft amortized at 6 percent interest for 30 years is equivalent to a firm supply purchase price of \$209/acft/yr ($\$1,700 \times 0.07265 \times 574,234/340,000$). Cost estimates for Edwards Transfers in the 2006 regional plan are based on the lease price of \$135/acft/yr. The annual cost of planned firm supply transfers of 71,335 acft/yr is estimated at \$9,630,225.

4C.2.4 Environmental Issues

The primary environmental concerns associated with Edwards Irrigation Transfers are the conversion of irrigated land to dryland crops or grassland, or a combination of dryland crops and grassland. Since both dryland crop and range grasslands are present within the area, demonstrating that dryland and range grasslands are possible for the region, the major concern is with establishment of vegetation upon acreages to be returned to grassland or range vegetation. An additional concern involves potential reductions in discharge at Comal and San Marcos Springs associated with increased pumpage from municipal wells closer to the springs.

⁴ Actual prices paid by San Antonio Water System in 2004, San Antonio Texas, 2005.

Table 4C.2-6
Estimated Economic Effects of Irrigation Water Transfer
Bexar, Medina and Uvalde Counties
South Central Texas Region

Factors	Units	Year					
		2010	2020	2030	2040	2050	2060
Irrigation Transfers (Unused Irrigation)*	Acre-Feet	19,223	16,350	10,219	5,589	2,407	0
Economic Effects Per Unit							
Farm Income Per Acre-Foot	Dollars	126	126	126	126	126	126
Purchased Inputs Per Acre-Foot	Dollars	84	84	84	84	84	84
Total Output Multiplier	Dollars	2.24	2.24	2.24	2.24	2.24	2.24
Regional Economic Effects							
Total Farm Income	Million Dollars	2.42	2.06	1.29	0.70	0.30	0.00
Total Purchased Inputs	Million Dollars	1.61	1.37	0.89	0.47	0.20	0.00
Total Economic Impact	Million Dollars	5.42	4.61	2.88	1.58	0.68	0.00
* Irrigation surpluses plus irrigation conservation potentials minus irrigation conservation to meet projected needs minus Firm Supply Transfers equals net quantities of transfers from irrigation to municipal and industrial uses (Table 4C.2-3).							

It is expected that dryland crop production can be carried out on acreages that were previously irrigated. However, fallow farmland to be converted to grassland with no native grass plantings could become infested with opportunistic weeds, followed by slower growing native thornbrush plants characteristic of the surrounding unimproved rangelands. Recovery of the land could take two decades or more, depending on use for cattle grazing and brush management practices. These lands, along with lands converted to improved rangeland, would eventually provide additional native species habitat. A program of converting cropland to native grasses would speed the process of reaching a mature native plant community and reduce the opportunity for soil erosion through water and winds. Such a program could provide habitat for native Texas wildlife, including the horned toad, tortoises, deer, hawks, and other dessert grassland species. The cost of seeding is not included in the purchase or lease price of the water.

No impacts to cultural resources are anticipated since this strategy does not involve construction.

4C.2.5 Water Quality and Treatability

No change is expected in water quality, since this water management strategy would reduce pumpage of Edwards Water for irrigation and allow equivalent quantities to be pumped for municipal and industrial purposes.

4C.2.6 Implementation Issues

The leasing and purchasing of Edwards Irrigation Water for municipal and industrial uses is being done to at the present time. Further implementation of this strategy will involve:

1. Willingness of Edwards Irrigation Permit holders to sell or lease permits issued for irrigation.
2. Approval by EAA of permit transfer and/or leases and compliance with critical period and other rules of the EAA.
3. Further evaluation of potential economic effects associated with the conversion from irrigated to other types of land use.
4. Further evaluation of potential effects of relocation of pumpage centers on discharges from Comal and San Marcos Springs and/or on species dependent upon Edwards Aquifer or spring habitats.