

**Expansion of Urban Area in Irrigation Districts  
of the Rio Grande River Basin, 1996 - 2006:  
*A Map Series***



March 27, 2009

Rio Grande Basin Initiative  
Irrigation Technology Center  
Texas AgriLife Extension Service

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## **CONTENTS**

ABOUT THIS MAP SERIES .....	1
DEFINITION OF URBAN AREA AND IRRIGATION DISTRICT.....	1
METHODS AND MATERIALS.....	1
SUMMARY OF ANALYSIS .....	4
ACKNOWLEDGEMENTS.....	5
RIO GRANDE BASIN INITIATIVE	

## **LIST OF TABLES**

TABLE 1. OFFICIAL NAMES AND ABBREVIATIONS USED IN THIS REPORT FOR IRRIGATION DISTRICTS IN THE RIO GRANDE BASIN OF TEXAS.....	2
TABLE 2. TEXAS CLASS A WATER RIGHTS OF IRRIGATION DISTRICTS IN THE LOWER RIO GRANDE BASIN AND THE WATER ALLOCATION FOR EL PASO UNDER THE RIO GRANDE COMPACT. ....	3
TABLE 3. URBAN AREA WITHIN COUNTIES IN 1996 AND 2006.....	4
TABLE 4. URBAN AREA WITHIN IRRIGATION DISTRICTS AS A PERCENTAGE OF TOTAL DISTRICT SERVICE AREA IN 1996 AND 2006. ....	6
TABLE 5. URBAN ACREAGE WITHIN IRRIGATION DISTRICTS IN 1996 AND 2006. ....	7

## **LIST OF MAPS**

EXPANSION OF URBAN AREA: EL PASO COUNTY 1996-2006 .....	8
EXPANSION OF URBAN AREA: MAVERICK COUNTY 1996-2006 .....	9
EXPANSION OF URBAN AREA: CAMERON COUNTY 1996-2006.....	10
EXPANSION OF URBAN AREA: HIDALGO COUNTY 1996-2006 .....	11
EXPANSION OF URBAN AREA: WILLACY COUNTY 1996-2006.....	12
IRRIGATION DISTRICTS OF THE LOWER RIO GRANDE VALLEY .....	13

## **About this Map Series**

The border region of Texas is experiencing rapid urban growth which is expected to have a continuing and increasing impact on the irrigation districts of the region. This report presents an analysis of the expansion of urban area during the ten year period from 1996 to 2006 in portions of the Rio Grande Basin.

This report includes maps of five counties: El Paso, Maverick, Cameron, Hidalgo and Willacy, which show the expansion of urban area over this ten year period. Also, shown on the maps are the service areas of 30 irrigation districts. Individual maps of the districts have been distributed to each district and are posted at <http://idea.tamu.edu>.

Hudspeth and Presidio Counties (and their associated irrigation districts: Hudspeth County Conservation and Reclamation District No.1 and Presidio County Water Improvement District No.1) are not included in this map series due to insignificant urban growth.

## **Definition of Urban Area and Irrigation District**

For this map series, “urban area” is loosely defined as a continuous developed and/or developing area that is no longer in agricultural use. We included all residential communities and subdivisions (with or without homes) that are clearly identifiable from aerial photographs. We also included properties with more than one dwelling or other structure on a single piece of property. Single dwellings on large properties outside the city limits were excluded.

Here, the term “irrigation district” refers to all irrigation, water control, water improvement, conservation, reclamation, and municipal utility districts that deliver agricultural irrigation water and hold Class A Agricultural Water Rights or a similar allocation. The official names of 32 Rio Grande Basin Irrigation Districts are given in Table 1 along with the corresponding abbreviations used on these maps. Table 2 lists their water right or allocation.

## **Methods and Materials**

The maps and calculations of urban area were done using the GIS (Geographic Information System) software program *ArcView 9.3* and are based on aerial photography taken in 1996 and 2006. This aerial photography or *Digital Orthophoto Quadrangle Imagery* (DOQs) was obtained from the Texas Natural Resources Information System <http://www.tnris.state.tx.us>). The 1996 DOQs have a resolution of 1 meter, while the 2006 DOQs have a 2 meter resolution.

Table 1. Official Names and Abbreviations used in this report for Irrigation Districts in the Rio Grande Basin of Texas.

<b>Official Name</b>	<b>Abbreviation</b>
Adams Garden Irrigation District No.19	Adams Garden
Bayview Irrigation District No.11	Bayview
Brownsville Irrigation District	Brownsville
Cameron County Water Improvement District No.16	CCWID16
Cameron County Irrigation District No.2	CCID2
Cameron County Irrigation District No.6	CCID6
Cameron County Water Improvement District No.10	CCWID10
Delta Lake Irrigation District	Delta Lake
Donna Irrigation District-Hidalgo County No.1	Donna
El Paso County Water Improvement District No.1	El Paso
Engelman Irrigation District	Engelman
Harlingen Irrigation District-Cameron County No.1	Harlingen
Hidalgo and Cameron County Irrigation District No.9	HCCID9
Hidalgo County Irrigation District No.1	HCID1
Hidalgo County Irrigation District No.13	HCID13
Hidalgo County Irrigation District No.16	HCID16
Hidalgo County Irrigation District No.19	HCID19
Hidalgo County Water Control and Improvement District No.18	HCWCID18
Hidalgo County Irrigation District No.2	HCID2
Hidalgo County Water Improvement District No.5	HCWID5
Hidalgo County Irrigation District No.6	HCID6
Hidalgo County Municipal Utility District No.1	HCMUD1
Hidalgo County Water Improvement District No.3	HCWID3
Hudspeth County Conservation & Reclamation District No.1	Hudspeth
La Feria Irrigation District-Cameron County No.3	La Feria
Maverick County Water Control & Improvement District No.1	Maverick
Presidio County Water Improvement District No.1	Presidio
Santa Cruz Irrigation District No.15	Santa Cruz
Santa Maria Irrigation District-Cameron County No.4	Santa Maria
United Irrigation District of Hidalgo County	United
Valley Acres Water District	Valley Acres
Valley Municipal Utility District No.2	VMUD2

Table 2. Texas Class A Water Rights of Irrigation Districts in the Lower Rio Grande Basin and the Water Allocation for El Paso under the Rio Grande Compact.

<b>District</b>	<b>Class A Water Right (Acre-Feet)</b>
Adams Garden Irrigation District No.19	18,738
Bayview Irrigation District No.11	16,978
Brownsville Irrigation District	33,949
Cameron County Water Improvement District No.16	3,713
Cameron County Irrigation District No.2	147,824
Cameron County Irrigation District No.6	52,142
Cameron County Water Improvement District No.10	8,488
Delta Lake Irrigation District	174,776
Donna Irrigation District-Hidalgo County No.1	94,064
El Paso County Water Improvement District No.1	388,000*
Engelman Irrigation District	20,044
Harlingen Irrigation District-Cameron County No.1	98,233
Hidalgo and Cameron County Irrigation District No.9	177,152
Hidalgo County Irrigation District No.1	85,615
Hidalgo County Irrigation District No.13	4,857
Hidalgo County Irrigation District No.16	30,749
Hidalgo County Irrigation District No.19	9,048
Hidalgo County Water Control and Improvement District No.18	5,318
Hidalgo County Irrigation District No.2	137,675
Hidalgo County Water Improvement District No.5	14,235
Hidalgo County Irrigation District No.6	34,913
Hidalgo County Municipal Utility District No.1	1,120
Hidalgo County Water Improvement District No.3	9,753
La Feria Irrigation District-Cameron County No.3	75,626
Maverick County Water Control & Improvement District No.1	134,900
Presidio County Water Improvement District No.1	2,780
Santa Cruz Irrigation District No.15	75,080
Santa Maria Irrigation District-Cameron County No.4	10,183
United Irrigation District of Hidalgo County	57,374
Valley Acres Water District	16,124
Valley Municipal Utility District No.2	5,511

\* Water allocation under the Rio Grande Compact

For this analysis, we used our estimate of the size of the service areas of the water districts. Urban area estimates have about a 10% margin of error. No legal descriptions of properties or survey data were used in the development of this map series. This project is solely intended to be an estimate of the urban growth in these particular counties and to illustrate possible trends affecting agriculture and irrigation district operations.

The authorized Class A water rights of the irrigation districts in the Lower Rio Grande Region were provided by the Rio Grande Water Masters office, Texas Commission on Environmental Quality. For El Paso where the water allocation under the Rio Grande compact is reported.

Other GIS datasets, shape files and features on these maps were developed by our team, the IDEA (Irrigation District Engineering and Assistance) Team as a part of the following projects:

- Integrated Water Resources Planning Project
- Region M Water Planning Project
- Region M Water Planning Project Updated
- Rio Grande Basin Initiative

See <http://idea.tamu.edu> for details.

### Summary of Analysis

Portions of the Rio Grande Basin of Texas are undergoing rapid urban growth which is resulting in “fragmentation” of many irrigation districts. Table 3 lists our estimates of the expansion of total urban area from 1996 to 2006 by county. The highest increase in both area and as a percentage of total area was in Hidalgo County.

Table 3. Urban Area within Counties in 1996 and 2006.				
Counties	Total Acreage	Urban Area 1996	Urban Area 2006	Increase
		Acreage	Acreage	%
Cameron	613,036	66,189	81,635	23
El Paso	656,492	208,180	234,155	12
Hidalgo	1,012,982	118,466	160,095	35
Maverick	826,915	9,816	12,019	22
Willacy	393,819	3,084	3,509	14

Table 4 lists the percent of urban area within 30 irrigation districts in 1996 and 2006. As a percentage of the district, the most urbanized district is HCMUD1 at 89.5%, while Valley Acres and Bayview are the least urbanized.

Table 5 lists our estimate of the total urban area within each district in terms of acres and in percentage increase from 1996 and 2006. HCID2 has the largest number of urban acres, while the largest increase in urban area as a percentage of the district was in HCID16, HCWCID18 and HCID19. On the other hand, there was no increase in VMUD2 and Valley Acres.

Based on water rights (Table 2), the districts vary greatly in size. In the Lower Rio Grande Basin, the smallest active district has 1,120 ac-ft of Class A Water Right, while the largest district has 177,151 ac-ft. Actual water allocations in any given year depend on the amount of water stored in Amistad and Falcon Reservoirs.

El Paso County Water Improvement District No.1 is allocated water according to the Rio Grande Compact. The District receives 388,000 ac-ft (“full allocation”) or 43% of the available water supply in Elephant Butt and Caballo Reservoirs, whichever is less. Hudspeth County Conservation & Reclamation District No.1 has Texas Class B water rights, and therefore is authorized to use water available downstream of El Paso.

## **Acknowledgements**

This map series was produced as part of the Rio Grande Basin Initiative, with funding provided by Texas AgriLife Extension Service through the Texas Water Resources Institute. This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2005-45048-03208. For program information, see <http://riogrande.tamu.edu>.



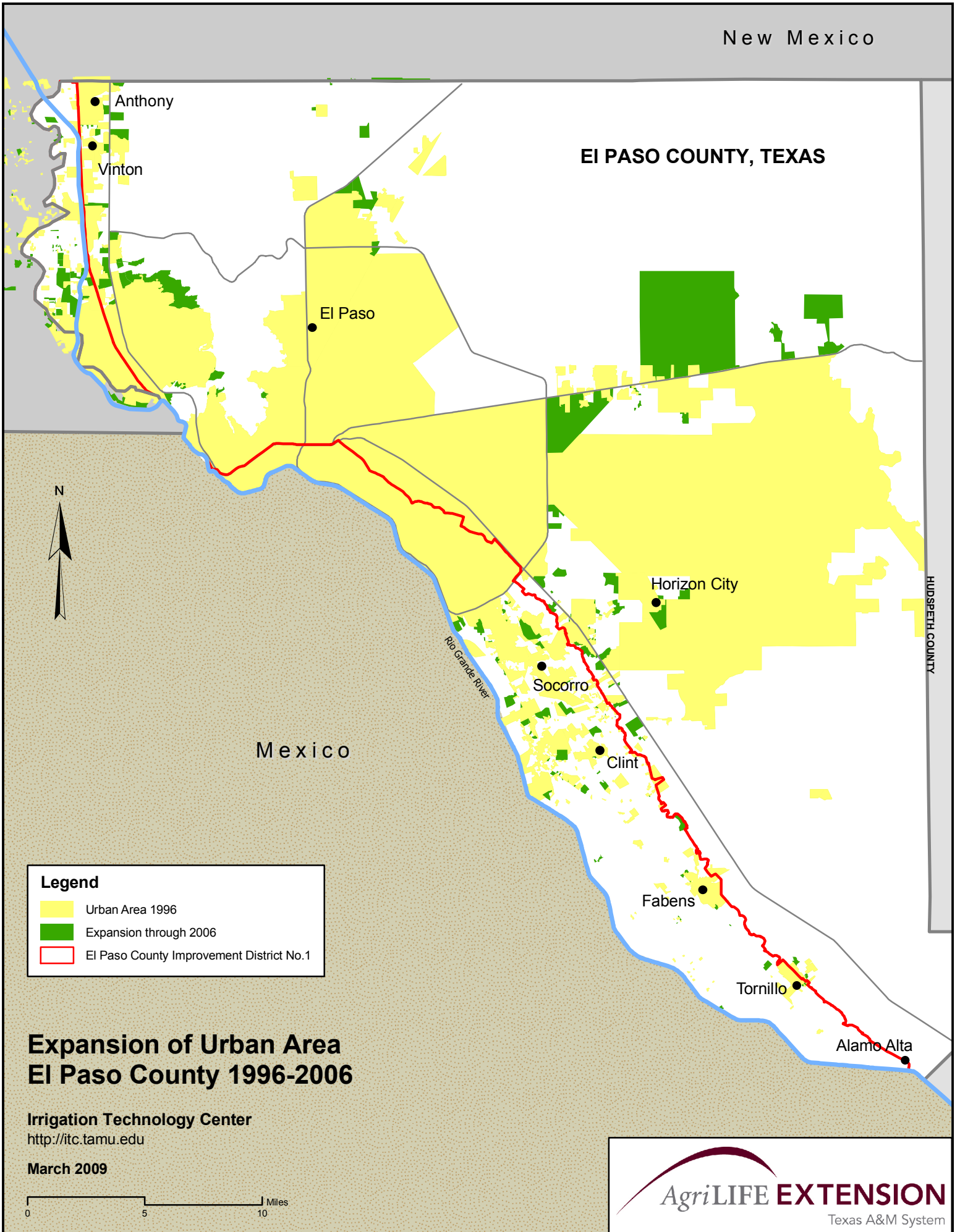
Table 4. Urban Area within irrigation districts as a percentage of total district service area in 1996 and 2006.

District	Approx. District Area	Percentage of District Area	
	Acreage	Urban Area 1996	Urban Area 2006
Adams Garden	9,600	5.5 %	14.4 %
Bayview	10,700	0.2 %	1.1 %
Brownsville	22,000	40.0 %	45.3 %
CCWID16	2,200	12.0 %	19.2 %
CCID2	79,000	10.6 %	13.8 %
CCID6	33,000	13.3 %	23.8 %
CCWID10	4,700	3.0 %	4.8 %
Delta Lake	85,600	1.3 %	2.2 %
Donna	47,000	9.3 %	15.5 %
El Paso	92,800	35.5 %	38.2 %
Engelman	11,200	1.3 %	2.9 %
Harlingen	56,500	26.0 %	30.0 %
HCCID9	87,900	19.0 %	26.0 %
HCID1	38,600	58.7 %	66.0 %
HCID13	2,200	5.4 %	21.5 %
HCID16	13,600	0.6 %	7.4 %
HCID19	4,800	0.0 %	40.0 %
HCWCID18	2,400	0.6 %	12.6 %
HCID2	72,600	45.5 %	54.0 %
HCWID5	8,100	14.1 %	17.6 %
HCID6	22,900	24.8 %	42.0 %
HCMUD1	2,000	50.3 %	89.5 %
HCWID3	9,100	72.4 %	76.0 %
La Feria	36,200	7.3 %	10.5 %
Maverick	148,700	0.1 %	8.1 %
Santa Cruz	39,500	7.3 %	9.4 %
Santa Maria	4,000	6.0 %	9.1 %
United	37,800	40.6 %	47.1 %
Valley Acres	11,200	1.4 %	1.4 %
VMUD2	4,800	23.8 %	23.8 %

Table 5. Urban Acreage within Irrigation Districts in 1996 and 2006.

	<b>Urban Area 1996</b>	<b>Urban Expansion through 2006</b>	<b>Percent Increase</b>
<b>District</b>	<b>Acreage</b>	<b>Acreage</b>	
Adams Garden	532	1,380	160 %
Bayview	24	120	392 %
Brownsville	8,724	9,915	14 %
CCWID16	260	415	60 %
CCID2	8,384	10,925	30 %
CCID6	4,439	7,948	79 %
CCWID10	135	224	66 %
Delta Lake	1,127	1,841	63 %
Donna	4,357	7,310	68 %
El Paso	32,967	35,443	8 %
Engelman	144	331	130 %
Harlingen	14,662	16,955	16 %
HCCID9	16,721	22,716	36 %
HCID1	22,633	25,327	12 %
HCID13	117	469	302 %
HCID16	83	1,005	1109 %
HCID19	0	1,908	–
HCWCID18	15	300	1924 %
HCID2	33,006	39,107	19 %
HCWID5	1,142	1,424	25 %
HCID6	5,677	9,595	69 %
HCMUD1	1,016	1,811	78 %
HCWID3	6,618	6,936	5 %
La Feria	2,626	3,809	45 %
Maverick	9,794	11,972	22 %
Santa Cruz	2,889	3,715	29 %
Santa Maria	242	365	51 %
United	15,336	17,794	16 %
Valley Acres	162	162	0 %
VMUD2	1,142	1,142	0 %

EI PASO COUNTY, TEXAS



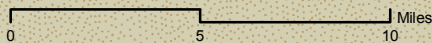
**Legend**

- Urban Area 1996
- Expansion through 2006
- El Paso County Improvement District No.1

### Expansion of Urban Area El Paso County 1996-2006

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KINNEY COUNTY

MAVERICK COUNTY, TEXAS

ZAVALA COUNTY

DIMMIT COUNTY

Rio Grande River

Mexico

Eagle Pass ●

**Legend**

- Urban Area 1996
- Expansion through 2006
- Maverick County Water Control & Improvement District No. 1

### Expansion of Urban Area Maverick County 1996-2006

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