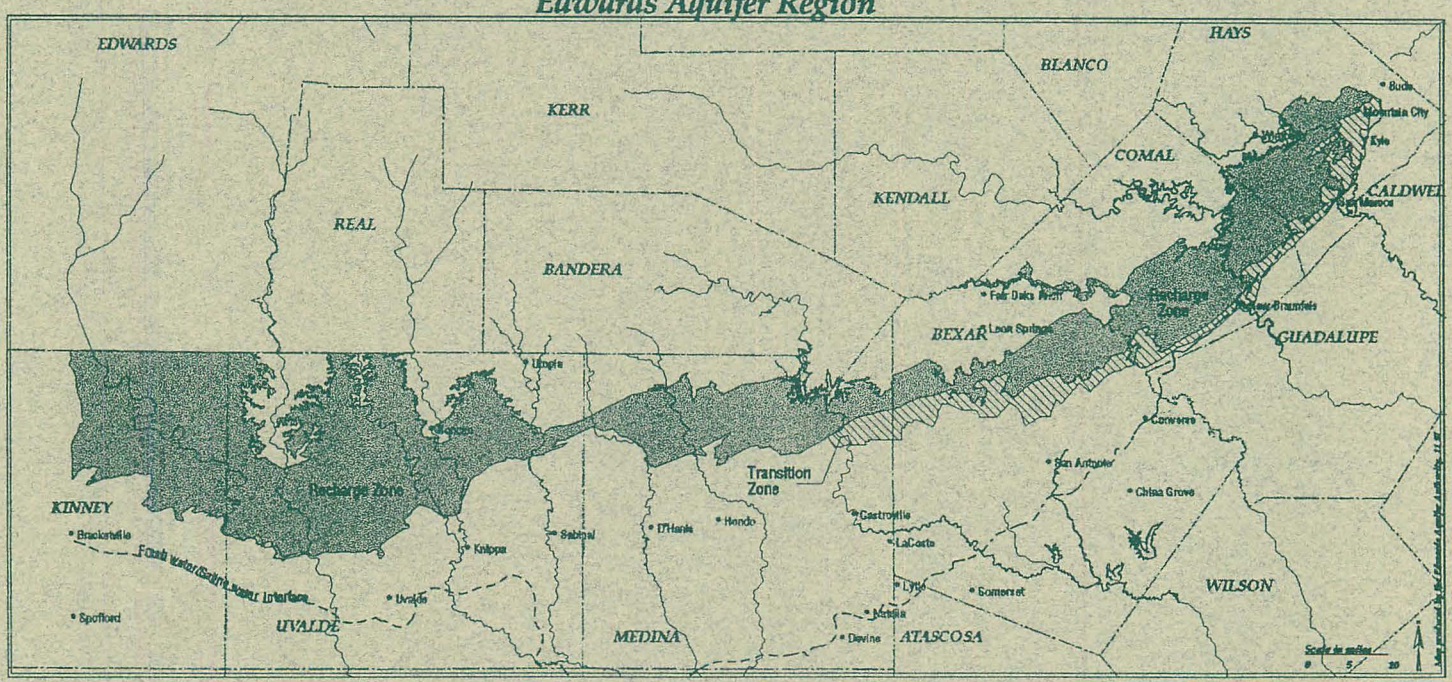
EDWARDS AQUIFER AUTHORITY

1615 N. St. Mary's
San Antonio, Texas

Report 97-01

Edwards Aquifer Hydrogeologic Report for 1996

Edwards Aquifer Region



Prepared by: The Water Resources Team

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EDWARDS AQUIFER AUTHORITY

1615 N. St. Mary's
San Antonio, Texas 78215

http://www.e-aquifer.com

EDWARDS AQUIFER HYDROGEOLOGIC REPORT FOR 1996

Compiled by:

Gregory D. James, Research Coordinator
Jesse Mireles, Field Inspector
Dee Molina, Geographic Information Systems Coordinator
Grant L. Snyder, Hydrogeologist
Steven D. Walthour, Field Services Program Manager

Gayle K. Kipp,
Water Resources Program Manager

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CONTENTS

1.0	INTRODUCTION	1
2.0	WATER LEVELS	3
3.0	PRECIPITATION	7
4.0	GROUNDWATER RECHARGE	11
5.0	GROUNDWATER DISCHARGE AND USAGE	17
6.0	WATER QUALITY	23
7.0	SUMMARY	30
8.0	DEFINITIONS	31
9.0	REFERENCES	34

TABLES

2.1	Annual water level highs and lows for selected index wells in the San Antonio area of the Edwards Aquifer, 1934-1996	5
3.1	Annual precipitation for selected rain gages in the Edwards Aquifer region, 1934-1996	9
3.2	Monthly precipitation data from Edwards Aquifer Authority rain gage network and National Oceanic and Atmospheric Administration precipitation gaging stations, 1996	10
4.1	Drainage basins that cross the Edwards Aquifer recharge zone	11
4.2	Estimated annual groundwater recharge to the Edwards Aquifer by river basin, 1934-1996	13
4.3	Monthly groundwater recharge at Edwards Aquifer Authority recharge projects, 1996	16
4.4	Estimated annual Edwards Aquifer recharge from Edwards Aquifer Authority recharge projects	16
5.1	Annual estimated groundwater discharge data by county for the Edwards Aquifer, 1934-1996	19
5.2	Estimated spring discharge from the Edwards Aquifer, 1996	20
5.3	Total groundwater discharge from the Edwards Aquifer, 1996	21
5.4	Annual estimated Edwards Aquifer discharge by use, 1955-1996	22
6.1	Groundwater quality standards	24
6.2	Volatile organic compounds	25
6.3	Classification of groundwater quality based on total dissolved solids	26
6.4	Secondary drinking water standards	28

FIGURES

1.1 Edwards Aquifer and other physiographic features in the San Antonio area 2
2.1 Water level comparison between the monthly average of record (1934-1996) and the monthly highs for 1996 at the Bexar County index well, AY-37-203 6
3.1 Regional rain gage network utilized by the Edwards Aquifer Authority to monitor precipitation 7
3.2 Precipitation for San Antonio, 1935-1996 8
4.1 Eight major drainage basins and Edwards Aquifer Authority recharge structures in the San Antonio area of the Edwards Aquifer 12
4.2 Annual recharge and 10-year floating average recharge for the San Antonio area of the Edwards Aquifer (1934-1996) 15
5.1 Major springs in the San Antonio area of the Edwards Aquifer 18
5.2 Groundwater pumping compared to springflow in the Edwards Aquifer, 1934-1996 21

APPENDICES

APPENDIX A – Water-Level Data

A-1 Bracken well (DX-68-30-208) daily high water levels (in feet above MSL), 1996 37
A-2 Landa Park well (DX-68-23-302) daily high water levels (in feet above MSL), 1996 37
A-3 City of Castroville well (TD-68-41-301) daily high water levels (in feet above MSL), 1996 38
A-4 City of Hondo index well (TD-69-47-306) daily high water levels (in feet above MSL), 1996 38
A-5 J-17, Bexar County index well (AY-68-37-203) daily high water levels (in feet above MSL), 1996 39
A-6 City of Uvalde index well (YP-69-50-302) daily high water levels (in feet above MSL), 1996 39

APPENDIX B – Water-Quality Data 40

PLATES (Located in pocket at back of report)

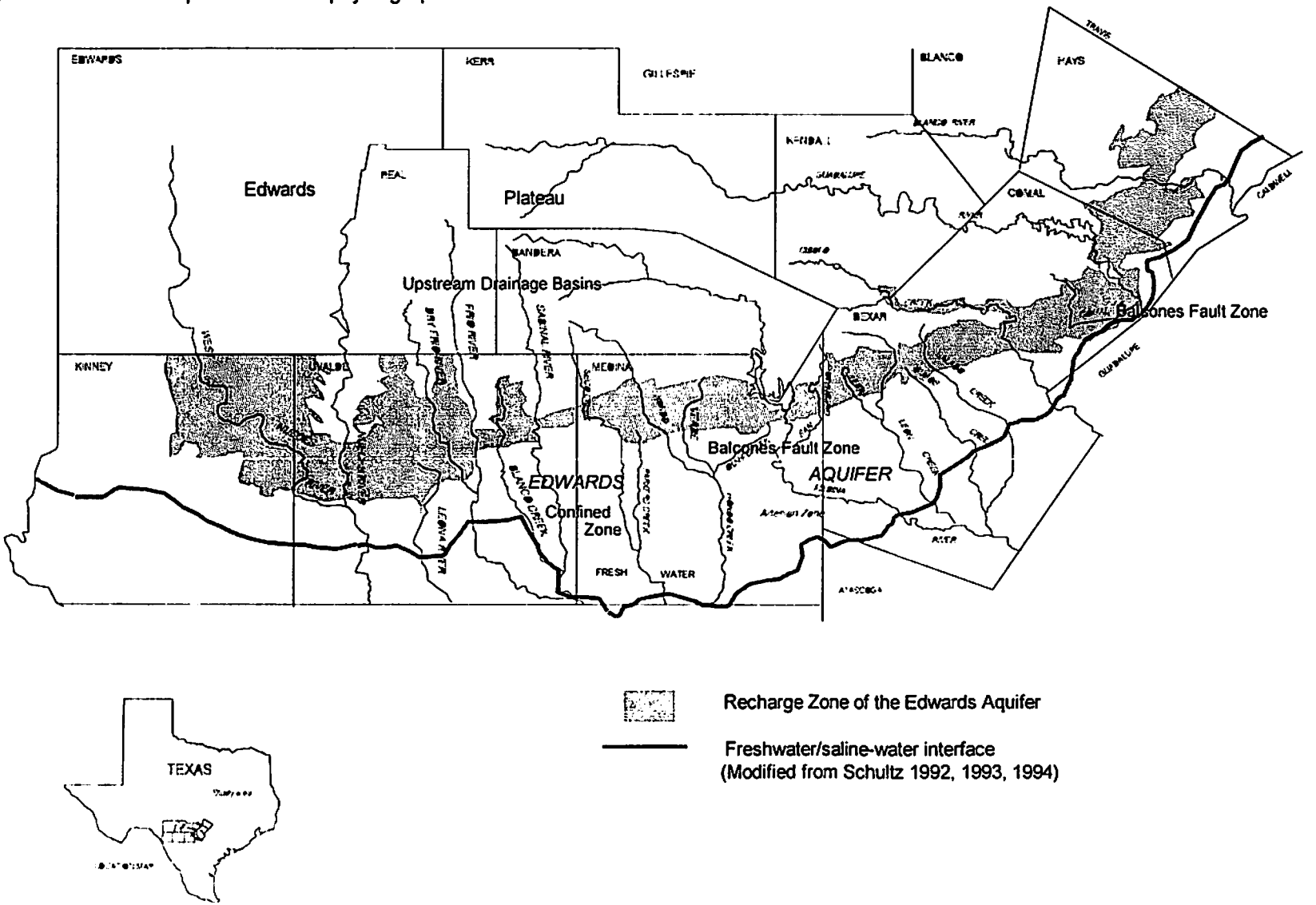
2.1 Water level observation network.
3.1 Real Time Data collection network.
6.1 Water quality – wells, springs and streams sampled.

1.0 INTRODUCTION

The Edwards Aquifer Authority (the Authority) was created by the Texas Legislature in 1993 to replace the Edwards Underground Water District (EUWD) and to manage, conserve, protect, recharge and prevent pollution of the groundwater in the Edwards Aquifer. In 1995, the Texas Legislature passed a bill that provided for elections of Authority directors in 1996. This technical data report for calendar year 1996 has been prepared in keeping with the Authority's statutory charge and provides a historical perspective by providing annual data for the period of record (1932-1996).

This report addresses the San Antonio Region of the Edwards Aquifer, which extends through South-Central Texas, from the groundwater divide near Brackettville in Kinney County to the groundwater divide near Kyle in central Hays County. **Figure 1.1** is a regional map showing primary physiographic features of the Edwards Aquifer within the report area.

Figure 1.1 Edwards Aquifer and other physiographic features in the San Antonio area.



2.0 WATER LEVELS

More than 850,000 water-level measurements from 25 digital recorder-equipped observation wells, as well as monthly measurements from 17 periodic observation wells were recorded in 1996 as part of the Authority's water-level data collection program. **Plate 2.1** shows the locations of the Authority's observation well network within the Edwards Aquifer region.

Periodic water-level measurements from a variety of wells have been compiled since 1929 in the San Antonio area of the Edwards Aquifer region. These periodic measurements were enhanced with the introduction of continuous water-level recorders in some of the observation wells in the 1930s by the United States Geological Survey (USGS). The Authority has further enhanced the data with the introduction of continuous digital recorders, developing a groundwater network from eastern Kinney County to central Hays County. All water-level measurements are made in feet above mean sea level (MSL).

The digital recorders measure water levels across the aquifer every 15 minutes, 365 days a year. These wells are equipped with a float device or a pressure transducer for water-level readings. Data are recorded on digital storage cards and then downloaded during a monthly site inspection, or by modem, to the Authority's office in San Antonio.

The water-level observation network consists of wells equipped with water-level recorders located in both the water-table (unconfined) and the artesian (confined) zones of the Edwards Aquifer. The Authority (and the EUWD) has also collected water-level data from the Trinity Aquifer (Glen Rose Formation) in northern Bexar County since 1991 and alluvial aquifers of the Leona Formation in southern Uvalde County since 1966. The Edwards and Trinity aquifers are hydraulically connected, allowing pathways for groundwater flow to and from the Edwards Aquifer. The Leona Formation in the vicinity of the Leona River of southern Uvalde County is recharged by Edwards Aquifer springflow of the Leona Springs. Water-level monitoring of the Edwards Aquifer and associated hydrogeologic units adds to the base of scientific knowledge and to help in the management of this regional water resource.

To augment the water-level observation network, Authority staff measure water levels at 17 observation wells on a monthly basis during normal aquifer conditions, and at least 50 additional wells during periods of extreme high or low water-level conditions. These periodic measurements are made manually with steel tape and electric-line measuring devices. Water-level data collected by the Authority are also forwarded to federal, state and regional agencies.

Historical water-level trends in observation wells, along with corresponding precipitation and discharge information, are necessary to determine the quantity of groundwater stored in the aquifer during any given period. Water-level increases generally indicate that greater quantities of water are recharging the aquifer than are being discharged. During periods when groundwater recharge is greater than discharge, springflow increases in proportion to increases in groundwater levels. Likewise, during drought or high-demand conditions, water levels and springflows generally decline, reflecting greater groundwater discharge than groundwater recharge. **Table 2.1** shows the annual and period of record high and low water levels measured in five selected Edwards Aquifer observation wells.

In 1996, total discharge was greater than total recharge as was demonstrated by generally declining water levels from January to December. The net change in water levels at the Bexar County index well between January and June was a decline of 37.4 feet. The remaining months of

the year indicated a slight rise of 22.9 feet, to end the year at 650.4 feet above MSL as measured at the Bexar County index well.

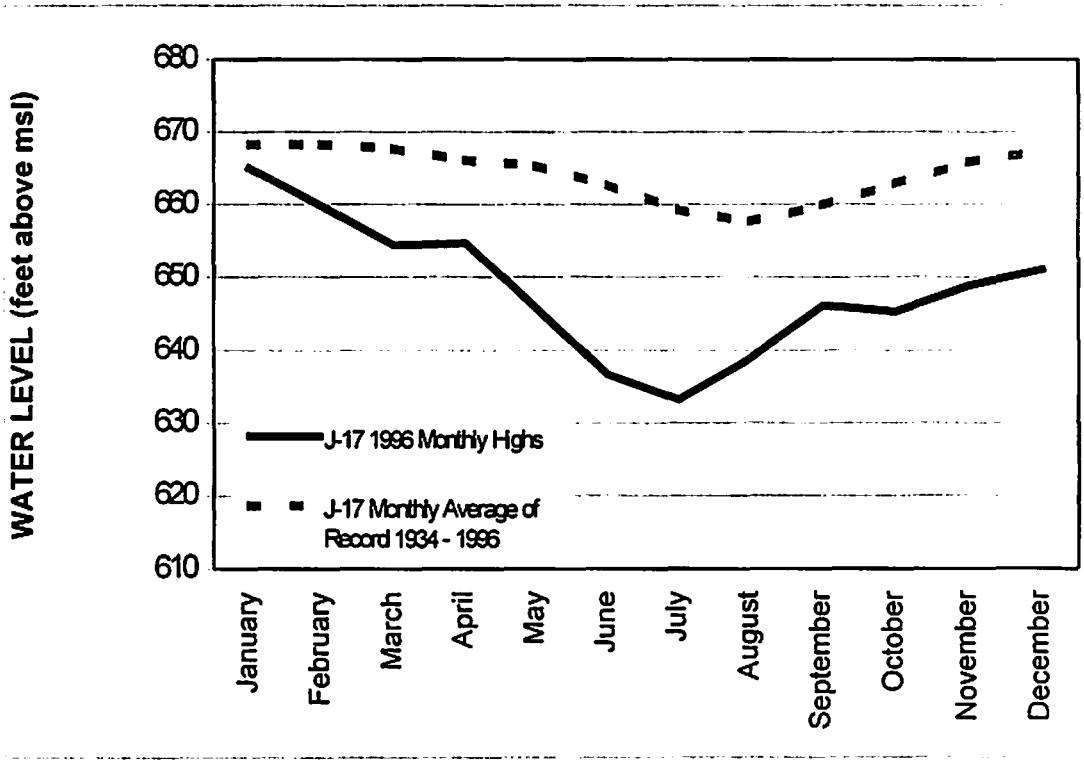
Edwards Aquifer water levels fluctuated dramatically in 1996. The lowest reading at the Bexar County index well since 1989 was measured at 627.5 feet above MSL in June. The average water level at the Bexar County index well for June was 662.7 above MSL, a difference of 35.2 feet between the average water level and the low water-level measurement in June. **Figure 2.1** compares the average water level for the period of record and maximum water levels for the year 1996. **Tables A-1** through **A-6** in **Appendix A** show 1996 water levels from selected observation wells.

Table 2.1 Annual water-level highs and lows for selected index wells in the San Antonio area of the Edwards Aquifer, 1934-1996 (Measured in feet above mean sea level).

Year	City of Uvalde Uvalde County YP-69-50-302		Castroville Medina County TD-68-41-301		San Antonio Bexar County AY-68-37-203		New Braunfels Comal County DX-68-23-302		San Marcos Hays County LR-61-01-304	
	High	Low	High	Low	High	Low	High	Low	High	Low
1934	866.6	----	----	----	675.2	666.8	----	----	----	----
1935	872.1	----	----	----	681.3	666.8	----	----	----	----
1936	876.6	876.5	----	----	683.0	676.6	----	----	----	----
1937	878.1	877.1	----	----	682.1	674.9	----	----	583.4	581.6
1938	875.8	874.0	----	----	681.4	673.6	----	----	590.6	581.5
1939	873.4	869.6	----	----	674.1	665.7	----	----	580.6	569.6
1940	872.3	868.5	----	----	671.4	661.0	----	----	572.2	568.7
1941	875.7	867.7	----	----	682.5	668.3	----	----	587.7	578.6
1942	875.8	871.9	----	----	685.4	669.7	----	----	580.8	573.7
1943	874.5	868.0	----	----	679.6	668.5	----	----	578.2	574.6
1944	869.3	866.8	----	----	677.6	667.1	----	----	580.5	579.3
1945	870.1	865.2	----	----	681.9	668.8	----	----	581.8	----
1946	867.1	862.9	----	----	681.2	663.6	----	----	580.3	----
1947	870.7	867.1	----	----	680.7	665.8	----	----	577.3	577.0
1948	868.4	860.5	----	----	667.7	653.7	624.4	624.3	560.5	559.4
1949	871.2	859.1	----	----	671.6	655.6	626.7	624.1	562.3	561.8
1950	871.2	861.8	687.0	674.9	665.4	653.8	625.2	624.0	575.8	575.2
1951	861.8	846.8	675.2	659.9	656.0	640.6	624.2	622.5	575.3	569.4
1952	846.8	834.9	663.8	649.9	650.5	633.4	623.0	621.5	573.0	569.1
1953	835.2	817.8	665.1	647.7	651.5	630.5	623.6	621.1	584.5	573.2
1954	836.7	823.1	660.3	642.4	646.3	628.9	623.1	620.5	581.8	562.8
1955	834.3	824.1	649.1	635.6	638.5	624.2	621.9	619.8	575.7	558.4
1956	834.2	814.2	641.6	622.3	632.2	612.5	621.0	613.3	569.8	542.2
1957	840.9	811.0	666.1	633.0	653.8	624.4	624.7	620.1	584.9	568.3
1958	866.1	840.8	704.4	665.7	679.6	653.3	626.6	624.6	593.6	580.8
1959	876.1	866.2	703.8	689.0	677.7	661.5	627.1	625.1	591.4	580.5
1960	876.9	873.1	706.3	686.0	679.4	657.9	627.1	624.9	589.4	584.3
1961	878.5	875.6	710.3	693.4	681.2	663.9	627.3	625.7	591.6	573.2
1962	878.3	867.7	703.6	676.3	675.5	646.9	626.3	623.2	584.1	565.0
1963	869.7	860.9	689.1	659.2	665.8	635.0	625.0	621.7	581.6	560.0
1964	860.9	849.0	676.3	654.8	657.1	632.8	624.1	621.6	578.2	562.8
1965	865.8	860.3	689.6	666.8	675.0	645.6	626.6	623.5	590.1	573.4
1966	867.2	860.2	686.1	665.0	668.8	642.7	625.9	623.1	589.0	566.6
1967	867.4	856.4	679.4	645.2	659.7	624.9	624.6	620.0	582.8	556.6
1968	873.3	864.8	702.0	679.2	678.3	655.9	627.2	624.6	593.8	574.4
1969	875.0	866.5	694.8	670.5	676.1	642.8	626.3	623.4	588.7	567.7
1970	876.1	871.3	700.7	678.8	677.1	650.4	627.2	624.3	593.2	575.0
1971	877.7	864.0	701.3	646.4	674.6	627.9	626.2	621.0	577.1	551.3
1972	877.8	874.6	704.6	676.7	679.0	651.2	626.7	624.1	579.7	576.3
1973	881.6	874.5	731.2	690.1	696.5	665.9	629.8	626.1	589.9	572.3
1974	881.4	876.0	723.8	696.0	689.2	660.9	629.1	625.8	593.6	558.5
1975	882.1	879.4	721.0	708.2	686.9	672.0	629.3	626.5	589.8	571.4
1976	884.9	876.0	732.4	694.9	693.1	663.8	629.4	625.8	584.6	571.2
1977	886.2	881.3	737.8	715.3	696.0	675.6	630.2	627.6	587.4	562.1
1978	882.6	875.6	722.4	681.7	684.1	650.1	628.1	624.5	572.0	540.4
1979	882.0	876.1	728.2	710.3	690.5	676.4	629.0	627.3	584.9	572.0
1980	879.1	868.0	716.1	666.8	680.3	640.8	627.5	623.0	572.0	551.8
1981	881.8	867.9	723.2	698.8	686.0	668.6	628.0	625.5	586.2	565.5
1982	881.8	876.4	717.1	682.8	680.5	645.3	627.3	623.6	584.7	544.7
1983	877.1	871.3	698.2	667.7	670.0	642.1	625.6	623.0	588.7	560.4
1984	873.3	856.9	684.5	642.0	657.0	623.3	624.4	619.6	582.5	544.3
1985	876.9	862.2	699.0	670.7	674.5	644.1	626.8	623.3	591.4	561.8
1986	877.8	872.2	704.6	674.2	685.6	649.8	627.7	624.1	595.0	576.3
1987	889.1	877.9	743.5	711.1	699.2	676.9	630.4	627.2	595.9	583.5
1988	887.0	878.0	725.3	679.9	684.9	647.7	627.9	623.9	593.2	585.9
1989	879.0	866.6	695.3	650.5	663.9	626.4	624.9	620.5	571.7	571.5
1990	872.9	861.6	679.5	640.8	658.1	622.7	624.3	620.3	577.6	561.2
1991	873.8	865.4	703.8	666.1	680.3	640.5	627.0	623.3	593.8	575.1
1992	885.2	872.9	743.6	704.3	703.3	680.7	630.9	627.0	595.4	586.2
1993	884.9	877.3	730.2	706.6	692.8	672.0	629.4	626.9	593.7	575.9
1994	----	----	718.6	684.1	679.2	652.1	627.2	624.7	575.0	545.3
1995	877.2	871.1	703.0	681.8	676.5	651.1	626.8	624.5	575.4	552.4
1996	874.2	859	693.0	650.2	664.9	627.5	625.3	621.2	573.2	551.30
Average	High	Low	High	Low	High	Low	High	Low	High	Low
	871.9	863.1	700.9	672.7	675.2	652.5	626.5	623.5	583.3	567..5
Record	High	Low	High	Low	High	Low	High	Low	High	Low
Level	889.1	811.0	743.6	622.3	703.3	612.5	630.9	613.3	595.9	540.4
Month	June	April	June	Aug.	June	Aug.	June	Aug.	Sept.	July
Year	1987	1957	1992	1956	1992	1956	1992	1956	1987	1978

Data source: Edwards Aquifer Authority, 1996.

Figure 2.1 Water-level comparison between the monthly average of record (1934-1996) and the monthly highs for 1996 at the Bexar County index well, AY-37-203.



3.0 PRECIPITATION

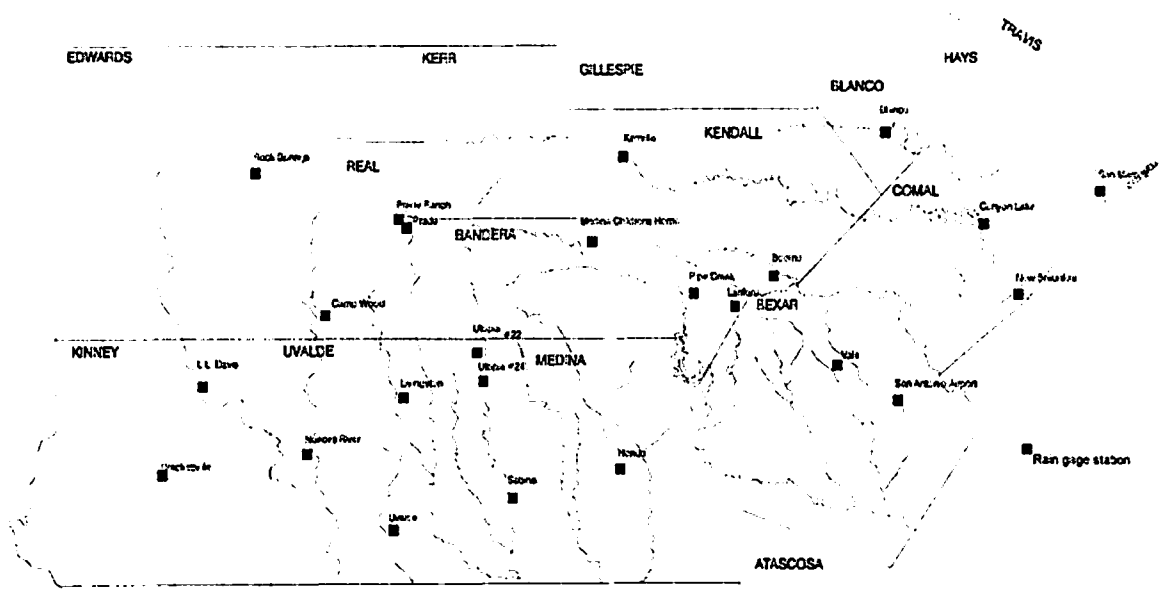
Precipitation is the primary source of recharge to the Edwards Aquifer. Water levels monitored by the Authority's network of observation wells across the Artesian Zone have risen within hours of a heavy rainfall event on the Edwards Aquifer Recharge Zone (EARZ) or associated upstream drainage basins in the central Texas Hill Country.

Annual precipitation in the Edwards Aquifer region is monitored by the Authority to determine the volume of groundwater recharge to the aquifer. Precipitation data are gathered from Authority rain gage stations, National Oceanic and Atmospheric Administration (NOAA) weather stations, and USGS rain gage stations located across the EARZ and upstream drainage basins.

A map showing the locations of the precipitation gaging stations the Authority uses to record area rainfall is shown in **Figure 3.1.**

A Real Time Data Network consisting of 68 rain-gage observation sites report precipitation data at six-minute intervals to the Authority office. In addition, daily precipitation data are forwarded every month to the Authority from seven rain-gage observation sites located on the EARZ. This information is augmented with data from numerous weather and rain-gage stations maintained by NOAA and the USGS. The precipitation information is used to calculate recharge and to monitor any precipitation trends that may affect recharge to the Edwards Aquifer. **Plate 3.1** indicates the locations of all Real Time Data sites.

Figure 3.1 Regional rain gage network utilized by the Edwards Aquifer Authority to monitor precipitation.



Precipitation data from San Antonio have been maintained since 1871. Historical aquifer water levels, recharge and springflow are closely related to precipitation and decrease during periods of low precipitation.

The amount of rainfall during 1996 was generally below normal levels in the Edwards Aquifer region. Average precipitation in San Antonio for the period between 1934 and 1996 is 28.68 inches. In 1996, total precipitation, measured at the San Antonio International Airport, was 17.8 inches, approximately 62 percent of the average. A hydrograph of precipitation for San Antonio from 1935 to 1996 is shown in **Figure 3.2**. **Table 3.1** shows annual precipitation for selected rain gages in the region. **Table 3.2** shows monthly measurements for 1996 at selected rain-gage stations across the region.

Figure 3.2 Precipitation for San Antonio, 1935-1996.

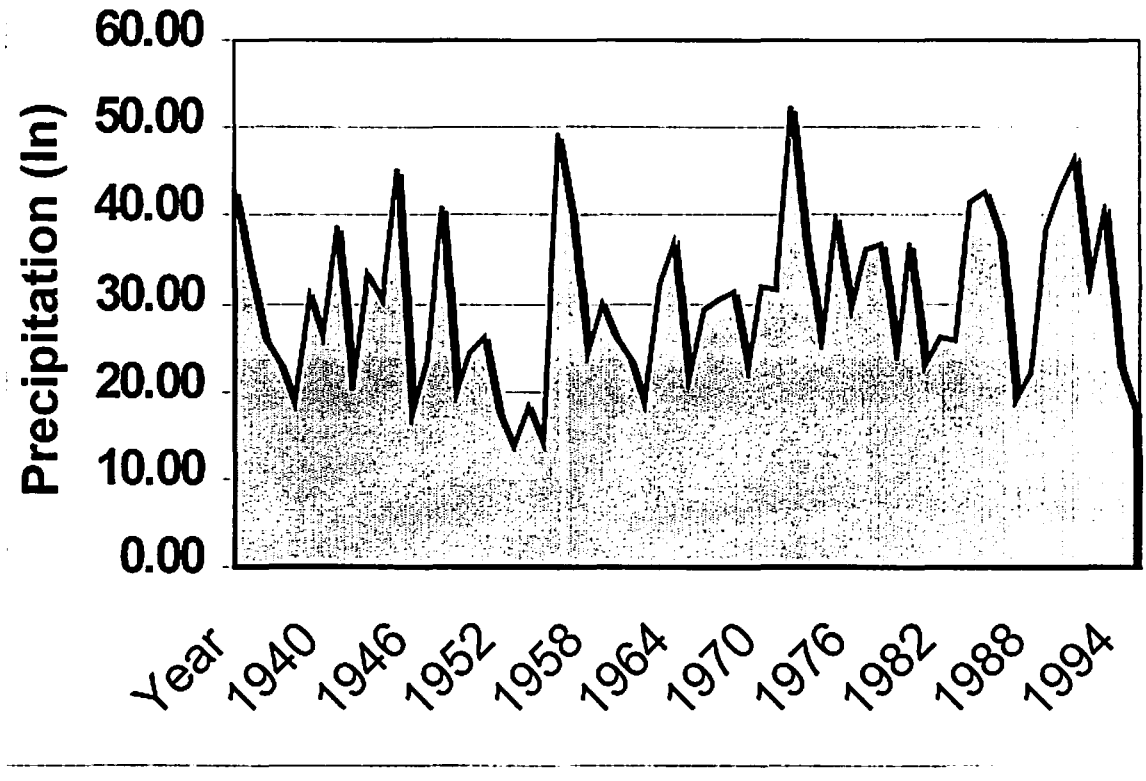


Table 3.1 Annual precipitation for selected rain gages in the Edwards Aquifer region, 1934-1996 (Measured in inches).

Year	Bracketville	Uvalde	Sabinal	Hondo	San Antonio	Boerne	New Braunfels	San Marcos
1934	---	16.70	18.07	23.97	27.65	26.78	30.80	35.67
1935	---	41.17	48.21	58.73	42.93	52.93	41.67	41.09
1936	22.34	24.53	26.53	35.27	34.11	47.59	30.41	33.48
1937	16.85	17.88	a/ 9.57	22.93	26.07	32.81	29.19	a/26.03
1938	19.97	13.12	15.39	27.56	23.26	24.14	28.32	28.17
1939	18.38	25.30	b/13.98	23.14	18.83	26.20	13.35	18.59
1940	22.43	27.66	27.51	28.13	30.79	32.29	38.11	43.57
1941	21.52	31.79	a/33.74	44.07	26.34	41.60	42.99	48.41
1942	21.01	19.01	a/11.37	34.83	38.46	31.12	42.08	44.65
1943	b/23.39	20.63	17.21	31.43	20.51	26.33	29.93	25.45
1944	24.76	32.76	a/27.62	32.46	33.19	42.98	43.14	47.42
1945	15.69	22.37	26.60	29.57	30.46	33.50	39.38	b/31.74
1946	19.10	26.41	a/14.16	29.65	45.17	45.62	61.60	52.24
1947	b/22.92	22.67	---	18.98	17.32	21.89	27.52	27.53
1948	a/20.02	18.31	---	28.82	23.64	23.77	b/19.88	a/21.27
1949	31.32	34.41	---	39.90	40.81	41.15	43.21	36.22
1950	17.70	18.27	a/15.28	24.91	19.86	24.94	21.13	21.10
1951	14.71	16.07	15.63	a/24.05	24.44	18.76	24.84	30.88
1952	12.26	18.24	23.16	25.56	26.24	37.54	33.87	39.91
1953	10.12	18.34	21.44	20.61	17.56	21.42	30.06	33.39
1954	19.38	15.60	14.72	11.92	13.70	10.29	10.12	13.42
1955	26.55	18.36	20.87	21.21	18.18	19.27	23.12	26.44
1956	7.58	9.29	11.29	15.54	14.31	12.05	18.41	18.37
1957	34.21	39.30	40.03	35.09	48.83	52.55	51.88	46.51
1958	45.37	39.03	41.18	41.60	39.69	40.94	36.40	39.08
1959	27.51	31.51	27.02	30.68	24.50	35.64	40.45	43.47
1960	19.12	23.98	26.24	32.37	29.76	32.55	34.28	45.48
1961	17.91	26.26	27.24	27.36	26.47	25.45	a/15.70	30.02
1962	10.87	14.12	13.58	17.85	23.90	25.26	27.40	28.47
1963	15.07	16.70	18.99	18.90	18.65	20.66	23.41	19.90
1964	20.75	22.30	23.78	28.29	31.88	27.36	30.65	30.27
1965	21.48	26.21	29.41	30.80	36.65	42.41	45.16	45.00
1966	21.63	20.87	21.54	29.46	21.44	29.05	25.98	27.12
1967	21.95	20.10	23.89	30.33	29.26	26.75	31.74	26.41
1968	17.26	25.20	b/29.88	31.91	30.40	35.14	35.97	37.13
1969	28.53	33.38	33.05	32.30	31.42	38.07	33.01	36.59
1970	16.50	13.59	22.13	30.96	22.74	27.79	35.23	32.30
1971	29.46	31.01	31.00	32.96	31.80	45.24	29.43	31.10
1972	21.21	15.49	21.10	25.43	31.49	35.09	42.02	31.90
1973	30.61	30.85	b/35.14	47.82	52.28	50.93	51.66	47.91
1974	18.25	30.94	b/20.93	b/36.41	37.00	41.80	42.85	a/37.28
1975	26.62	24.92	23.65	a/25.84	25.67	33.49	35.82	48.64
1976	34.40	46.04	40.82	45.21	39.13	45.24	49.06	47.46
1977	15.06	19.90	17.06	19.40	29.64	32.43	24.83	29.69
1978	19.04	18.48	21.28	24.64	35.99	35.17	b/36.35	33.08
1979	16.34	32.35	31.44	28.83	36.64	39.97	36.72	38.74
1980	18.33	23.05	22.67	21.27	24.23	39.02	33.69	29.56
1981	28.73	26.24	30.19	27.40	36.37	41.05	43.23	49.62
1982	19.10	23.35	18.44	21.99	22.96	27.64	21.04	b 22.47
1983	19.35	a/24.45	23.33	b/20.92	26.11	34.60	34.13	36.95
1984	16.24	b/15.33	20.67	a/21.19	25.95	26.97	20.90	a/ 8.26
1985	18.93	a/ 5.76	23.67	21.94	41.43	37.77	37.26	33.54
1986	27.44	b/29.86	b/29.62	b/36.01	42.73	43.52	47.14	42.20
1987	39.45	36.39	38.36	40.09	37.96	39.86	a/37.33	37.94
1988	12.08	15.20	13.52	b/ 9.81	19.01	19.49	b/16.27	21.50
1989	16.98	18.65	17.26	16.10	22.14	25.14	20.99	25.46
1990	b/38.24	24.73	30.06	27.01	38.31	42.51	a/24.58	b/35.14
1991	23.11	21.77	31.12	34.55	42.76	48.22	56.55	51.07
1992	22.22	a/27.85	37.73	45.34	46.49	64.17	b/38.84	b/40.33
1993	15.18	c/9.32	13.20	16.60	32.00	24.02	b/19.54	b/21.01
1994	a/22.85	39.61	29.32	b/22.38	40.42	40.98	a/35.76	40.85
1995	25.87	19.47	27.55	24.55	23.20	30.29	23.29	32.57
1996	b/20.32	16.20	14.20	15.50	17.80	24.57	19.00	28.20
Years of Record	95	93	78	92	112	93	97	93
Yearly Average	21.24	24.66	25.3	28.35	28.68	33.30	32.24	33.86

a/ Partial record not included in long-term average; missing one month.
b/ Partial record not included in long-term average; missing more than one month.
The symbol "---" indicates no data available.
Data source: US Department of Commerce (1934-1996).

Table 3.2 Monthly precipitation data from Edwards Aquifer Authority rain-gage network and National Oceanic and Atmospheric Administration precipitation-gaging stations, 1996 (Measured in inches).

Gage	County	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Vanderpool	Bandera	0.12	0.63	0.73	0.86	2.27	2.25	2.58	1.87	3.45	5.07	3.33	1.41
Children's Home	Bandera	0.00	0.60	0.50	1.72	1.45	1.85	1.42	6.47	6.15	4.70	2.78	0.87
Vale	Bexar	0.00	0.70	0.00	1.00	0.45	4.05	0.20	2.74	5.55	---	2.67	0.25
New Braunfels	Comal	0.02	0.03	1.47	2.22	0.3	1.42	0.79	5.04	2.58	0.3	3.21	1.66
San Marcos	Hays	0.04	0.04	0.6	2.28	0.57	4.52	0.19	11.0	3.64	0.87	2.64	1.80
Boerne	Kendall	0.00	0.21	0.96	0.43	0.54	1.66	1.48	3.85	1.68	0.9	1.62	0.86
Bracketville	Kinney	0.00	0.36	0.54	0.44	1.06	0.6	0.66	4.21	4.32	8.51	N/D	0.38
Hondo	Medina	0.00	0.17	0.77	1.11	0.59	2.15	1.95	2.57	1.84	1.58	2.17	0.58
Prade Ranch	Real	0.00	0.45	0.30	1.30	3.08	1.00	1.10	3.32	5.70	7.75	2.80	1.30
Livingston	Uvalde	0.00	0.00	0.80	0.63	1.12	0.36	2.65	4.81	5.77	4.65	1.05	0.60
Utopia 22	Uvalde	0.00	0.95	0.25	0.35	1.90	1.15	1.15	5.05	1.15	0.95	1.95	1.30
Utopia 24	Uvalde	0.00	0.81	0.30	0.45	0.51	2.07	1.80	3.87	2.85	3.85	1.00	1.10

The symbol "---" indicates no data available at time of publication.
Data source: Edwards Aquifer Authority and US Department of Commerce, 1996.

4.0 GROUNDWATER RECHARGE

The segment of the EARZ that supplies groundwater to the San Antonio area of the Edwards Aquifer extends from central Kinney County to central Hays County. **Figure 4.1** identifies the eight drainage basins that cross the EARZ. These basins are also listed below in **Table 4.1.**

Table 4.1 Drainage basins that cross the Edwards Aquifer Recharge Zone.

Nueces-West Nueces River basin
Frio-Dry Frio River basin
Sabinal River basin
Medina River basin
Comal Creek basin
Cibolo Creek and Dry Comal Creek basin
Guadalupe River basin
Blanco River basin

Although some recharge to the Edwards Aquifer is provided by other hydraulically connected aquifers, this type of recharge has not been quantified. Only surface water data from precipitation and streamflows are utilized to calculate total recharge.

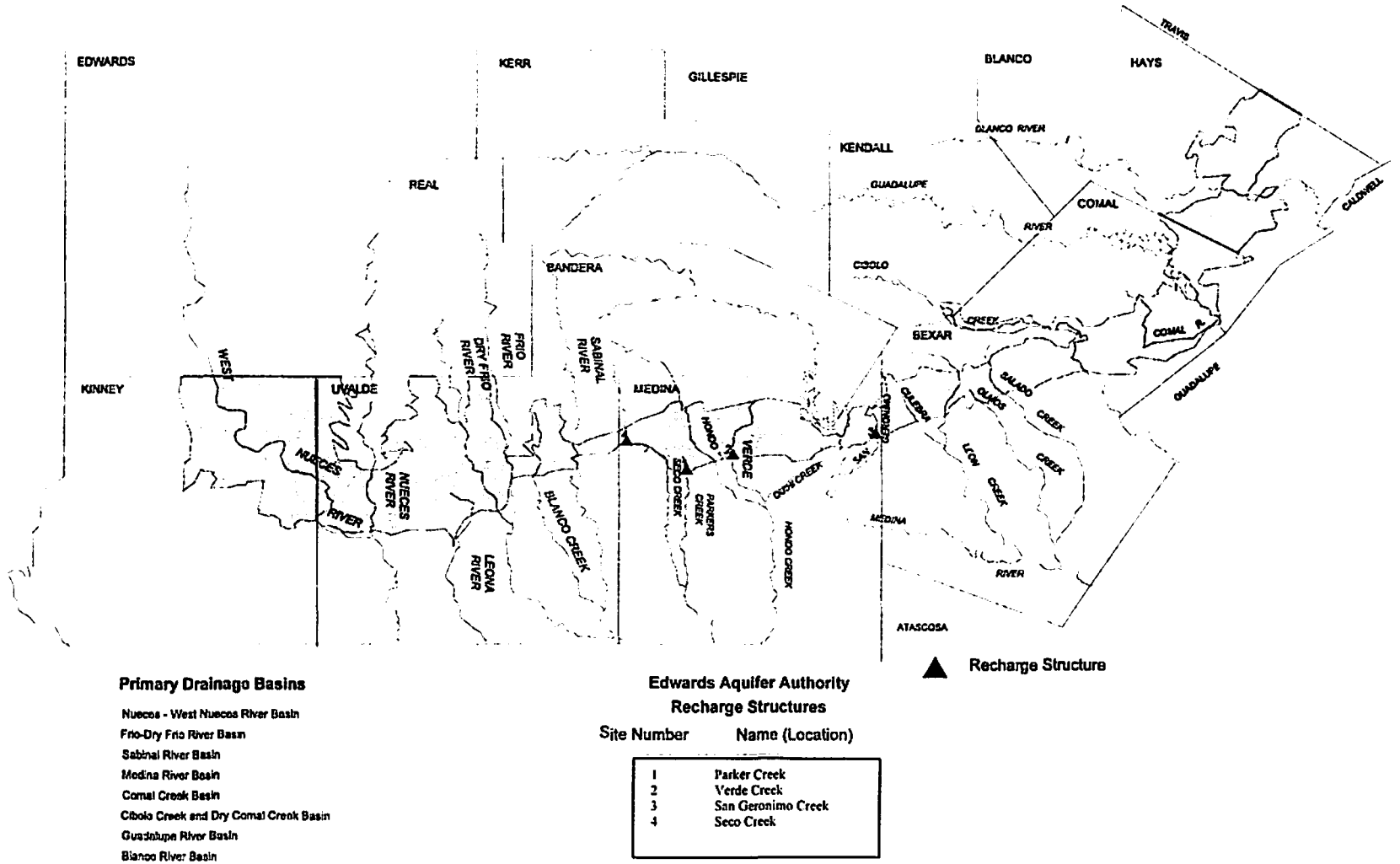
The USGS has been calculating groundwater recharge to the Edwards Aquifer since 1934. **Table 4.2** shows annual recharge by river basin from 1934 through 1996, based on USGS calculations.

The USGS estimates annual recharge for the period of record, 1934 to 1996, ranges from 43,700 acre-feet at the height of the drought in 1956 to 2,486,000 acre-feet in 1992. In 1996, estimated recharge was 324,300 acre-feet. The average annual recharge from 1934 to 1996 was 668,700 acre-feet. However, since 1987, the 10-year average annual recharge is estimated to be approximately 953,200 acre-feet. **Figure 4.2** is a graph of yearly recharge and the 10-year floating average recharge estimate for the San Antonio area of the Edwards Aquifer from 1934 to 1996.

Recharge directly affects groundwater levels in the aquifer. Water levels rise during years of higher-than-normal recharge, and generally decline during periods of normal to below-normal recharge. Since recharge is a direct result of precipitation, water levels in the aquifer are greatly affected by rainfall. The lower than normal rainfall conditions in 1996 resulted in the lowest recharge to the Edwards Aquifer since 1984.

The Authority operates four recharge dams across the EARZ. The locations of the recharge structures are shown in **Figure 4.1.** These structures did not contribute any recharge to the aquifer in 1996. The average annual recharge is 3,007 acre-feet. **Table 4.3** shows the 1996 monthly recharge to the Edwards Aquifer by each structure and **Table 4.4** shows the annual historical recharge recorded for each site since construction.

Figure 4.1 Eight major drainage basins and Edwards Aquifer Authority recharge structures in the San Antonio area of the Edwards Aquifer.



Primary Drainage Basins

- Nueces - West Nueces River Basin
- Frio-Dry Frio River Basin
- Sabinal River Basin
- Medina River Basin
- Comal Creek Basin
- Cibolo Creek and Dry Comal Creek Basin
- Guadalupe River Basin
- Blanco River Basin

Edwards Aquifer Authority Recharge Structures

Site Number	Name (Location)
1	Parker Creek
2	Verde Creek
3	San Geronimo Creek
4	Seco Creek

Table 4.2 Estimated annual groundwater recharge to the Edwards Aquifer by river basin, 1934-1996 (Measured in thousands of acre-feet).

Year	Nueces River-West Nueces River basin	Frio River-Dry Frio River basin	Sabinal River basin	Area between Sabinal River and Medina River basin	Medina River basin	Area between Medina River and Cibolo Creek - Dry Comal Creek basin	Cibolo Creek - Dry Comal Creek basin	Blanco River basin	Total
1934	8.6	27.9	7.5	19.9	46.5	21	28.4	19.8	179.6
1935	411.3	192.3	56.6	166.2	71.1	138.2	182.7	39.8	1258.2
1936	176.5	157.4	43.5	142.9	91.6	108.9	146.1	42.7	909.6
1937	28.8	75.7	21.5	61.3	80.5	47.8	63.9	21.2	400.7
1938	63.5	69.3	20.9	54.1	65.5	46.2	76.8	36.4	432.7
1939	227	49.5	17	33.1	42.4	9.3	9.6	11.1	399
1940	50.4	60.3	23.8	56.6	38.8	29.3	30.8	18.8	308.8
1941	89.9	151.8	50.6	139	54.1	116.3	191.2	57.8	850.7
1942	103.5	95.1	34	84.4	51.7	66.9	93.6	28.6	557.8
1943	36.5	42.3	11.1	33.8	41.5	29.5	58.3	20.1	273.1
1944	64.1	76	24.8	74.3	50.5	72.5	152.5	46.2	560.9
1945	47.3	71.1	30.8	78.6	54.8	79.6	129.9	35.7	527.8
1946	80.9	54.2	16.5	52	51.4	105.1	155.3	40.7	556.1
1947	72.4	77.7	16.7	45.2	44	55.5	79.5	31.6	422.6
1948	41.1	25.6	26	20.2	14.8	17.5	19.9	13.2	178.3
1949	166	86.1	31.5	70.3	33	41.8	55.9	23.5	508.1
1950	41.5	35.5	13.3	27	23.6	17.3	24.6	17.4	200.2
1951	18.3	28.4	7.3	26.4	21.1	15.3	12.5	10.6	139.9
1952	27.9	15.7	3.2	30.2	25.4	50.1	102.3	20.7	275.5
1953	21.4	15.1	3.2	4.4	36.2	20.1	42.3	24.9	167.6
1954	61.3	31.6	7.1	11.9	25.3	4.2	10	10.7	162.1
1955	128	22.1	0.6	7.7	16.5	4.3	3.3	9.5	192
1956	15.6	4.2	1.6	3.6	6.3	2	2.2	8.2	43.7
1957	108.6	133.6	65.4	129.5	55.6	175.6	397.9	76.4	1142.6
1958	266.7	300	223.8	294.9	95.5	190.9	268.7	70.7	1711.2
1959	109.6	158.9	61.6	96.7	94.7	57.4	77.9	33.6	690.4
1960	88.7	128.1	64.9	127	104	89.7	160	62.4	824.8
1961	85.2	151.3	57.4	105.4	88.3	69.3	110.8	49.4	717.1
1962	47.4	46.6	4.3	23.5	57.3	16.7	24.7	18.9	239.4
1963	39.7	27	5	10.3	41.9	9.3	21.3	16.2	170.7
1964	126.1	57.1	16.3	61.3	43.3	35.8	51.1	22.2	413.2
1965	97.9	83	23.2	104	54.6	78.8	115.3	66.7	623.5
1966	169.2	134	37.7	78.2	50.5	44.5	66.5	34.6	615.2
1967	82.2	137.9	30.4	64.8	44.7	30.2	57.3	19	466.5
1968	130.8	176	66.4	198.7	59.9	83.1	120.5	49.3	884.7
1969	119.7	113.8	30.7	84.2	55.4	60.2	99.9	46.6	610.5
1970	112.6	141.9	35.4	81.6	68	68.8	113.8	39.5	661.6
1971	263.4	212.4	39.2	155.6	68.7	81.4	82.4	22.2	925.3
1972	108.4	144.6	49	154.6	87.9	74.3	104.2	33.4	756.4
1973	190.6	256.9	123.9	286.4	97.6	237.2	211.7	82.2	1486.5
1974	91.1	135.7	36.1	115.3	96.2	68.1	76.9	39.1	658.5
1975	71.8	143.6	47.9	195.9	93.4	138.8	195.7	85.9	973
1976	150.7	238.6	68.2	182	94.5	47.9	54.3	57.9	894.1
1977	102.9	193	62.7	159.5	77.7	97.9	191.6	66.7	952
1978	69.8	73.1	30.9	103.7	76.7	49.6	72.4	26.3	502.5
1979	128.4	201.4	68.6	203.1	89.4	85.4	266.3	75.2	1117.8
1980	58.6	85.6	42.6	25.3	88.3	18.8	55.4	31.8	406.4
1981	205	365.2	105.6	252.1	91.3	165	196.8	67.3	1448.3
1982	19.4	123.4	21	90.9	76.8	22.6	44.8	23.5	422.4
1983	79.2	85.9	20.1	42.9	74.4	31.9	62.5	23.2	420.1
1984	32.4	40.4	8.8	18.1	43.9	11.3	16.9	25.9	197.7
1985	105.9	186.9	50.7	148.5	64.7	136.7	259.2	50.7	1003.3
1986	188.4	192.8	42.2	173.6	74.7	170.2	267.4	44.5	1153.8
1987	308.5	473.3	110.7	405.5	90.4	229.3	270.9	114.9	2003.5
1988	59.2	117.9	17	24.9	69.9	12.6	28.5	25.5	355.5

Table 4.2 (Cont'd)

Year	Nueces River-West Nueces River basin	Frio River-Dry Frio River basin	Sabinal River basin	Area between Sabinal River and Medina River basin	Medina River basin	Area between Medina River and Cibolo Creek-Dry Comal Creek basin	Cibolo Creek - Dry Comal Creek basin	Blanco River basin	Total
1990	479.3	255	54.6	131.2	54	35.9	71.8	41.3	1123.1
1991	325.2	421	103.1	315.2	52.8	84.5	109.7	96.9	1508.4
1992	234.1	586.9	201.1	566.1	91.4	290.6	286.6	226.9	2486
1993	32.6	78.5	29.6	60.8	78.5	38.9	90.9	37.8	447.6
1994	124.6	151.5	29.5	45.1	61.1	34.1	55.6	36.6	538.1
1995	107.1	147.6	34.7	62.4	61.7	36.2	51.1	30.6	531.3
1996	130.0	92.0	11.4	9.4	42.3	10.6	14.7	13.9	324.3
For the period of record 1934-1996:									
Average	115.6	131.9	41.4	105.5	61.0	68.6	103.3	41.3	668.7
Median	91.1	113.8	30.8	78.2	57.3	49.6	76.9	33.6	538.1
For the period of record 1987-1996:									
Average	185.3	237.6	60.01	163.4	64.9	77.7	99.2	64.8	953.2
Median	127.3	149.6	32.2	61.6	61.4	36.1	63.7	37.2	534.7

Data source: USGS, 1996.

Figure 4.2 Annual recharge and 10-year floating average recharge for the San Antonio area of the Edwards Aquifer (1934-1996).

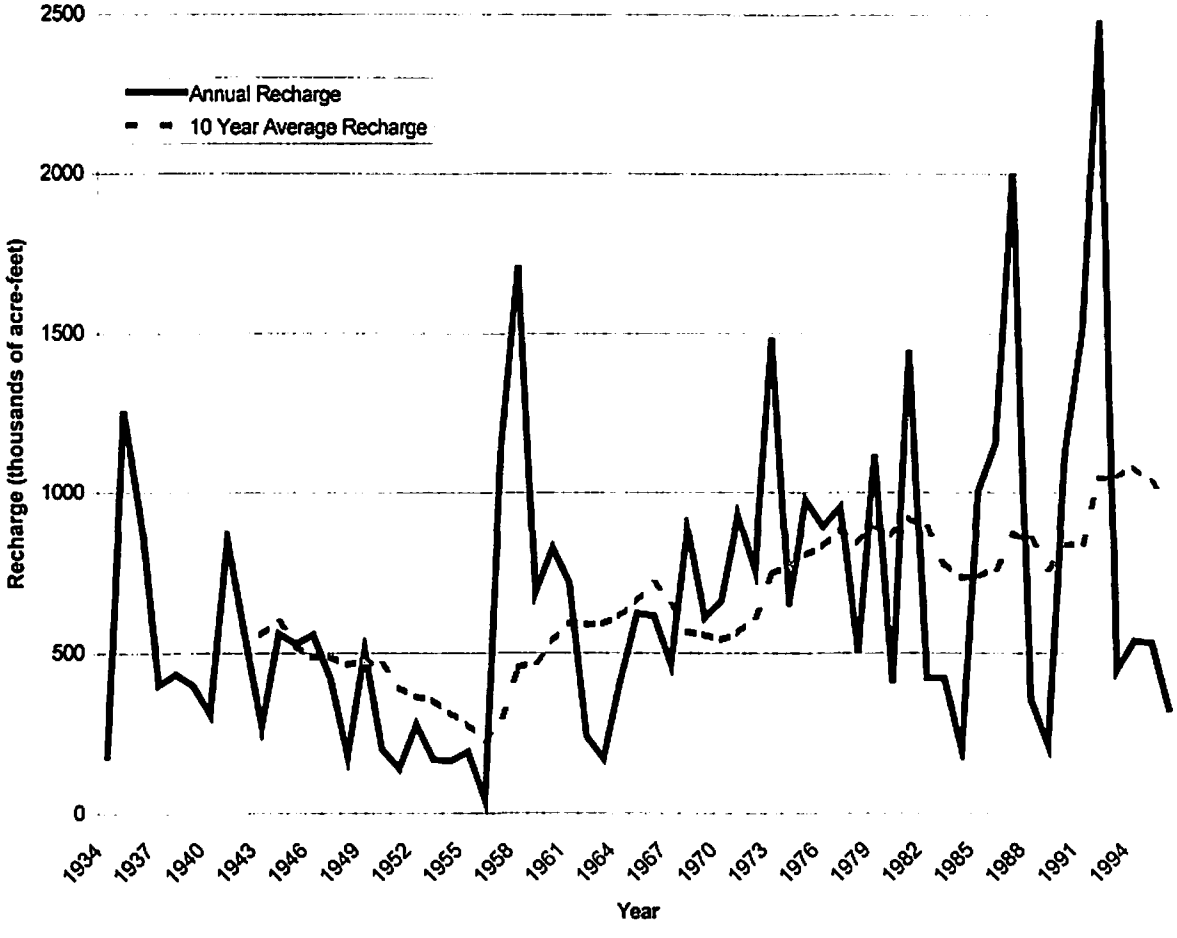


Table 4.3 Monthly groundwater recharge at Edwards Aquifer Authority recharge projects, 1996 (Measured in acre-feet).

Month	Parker Creek Dam Adjudication No. 3192	Verde Creek Dam Adjudication No. 3444	San Geronimo Creek Dam Adjudication No. 2956	Seco Creek Dam Adjudication No. 3551
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Total	0	0	0	0

Data source: USGS and Edwards Aquifer Authority, 1996.

Table 4.4 Estimated annual Edwards Aquifer recharge from Edwards Aquifer Authority recharge projects (Measured in acre-feet).

Year	Parker (4-20-74)	Verde (4-28-78)	San Geronimo (11-13-79)	Seco (10-21-82)	Yearly Total
1974	160	---	---	---	160
1975	620	---	---	---	620
1976	2,018	---	---	---	2,018
1977	6	---	---	---	6
1978	98	150	---	---	248
1979	2,315	1,725	0	---	4,040
1980	0	371	903	---	1,274
1981	772	1,923	1,407	---	4,102
1982	3	112	91	0	206
1983	0	254	0	0	254
1984	251	246	0	143	640
1985	232	440	1,097	643	2,412
1986	217	889	963	1,580	3,649
1987	2,104	4,141	1,176	12,915	20,336
1988	0	0	0	0	0
1989	0	0	0	0	0
1990	49	176	41	479	745
1991	647	966	1,647	2,160	5,420
1992	723	2,775	2,874	14,631	21,003
1993	0	0	334	508	842
1994	159	0	0	5	164
1995	18	79	51	880	1,028
1996	0	0	0	0	0
Total	10,392	14,247	10,584	33,944	69,167
Average	452	750	588	2263	3007
Median	159	246	71	479	745

Data source: Edwards Aquifer Authority, 1996.

5.0 GROUNDWATER DISCHARGE AND USAGE

The Edwards Aquifer provides water for many diverse uses in South Central Texas, including agricultural, municipal, industrial, domestic and recreational needs. Groundwater is discharged from the Edwards Aquifer through springflow or from wells.

Springflow supports recreational economies in New Braunfels and San Marcos, and provides habitat for threatened and endangered animal and plant species. The amount of groundwater discharged as springflow is greater than the amount discharged through wells for any of the above-mentioned uses. Springflow is calculated by measuring the downstream flow from springs, or by measuring water levels in observation wells near the springs and making corrections from these values. A location map of the major springs of the Edwards Aquifer is shown in **Figure 5.1.**

Groundwater discharge resulting from pumping is calculated by tabulating reported water-use data from public supply, irrigation, agricultural, industrial, commercial and domestic wells.

Estimates for annual groundwater discharge from springflow and pumping for the Edwards Aquifer are available from 1934 to 1996, and range from the calculated low of 388,100 acre-feet in 1955 to the calculated high of 1,100,000 acre-feet in 1992.

Table 5.1 contains annual estimated groundwater discharge data for the San Antonio area of the Edwards Aquifer from 1934 to 1996. Spring discharge from the Edwards Aquifer for 1996 was calculated at 212,000 acre-feet and accounted for 30 percent of total discharge from the Edwards Aquifer in 1996.

Springflow from 1934 to 1996 has varied from a low of 69,800 acre-feet in 1956 to a high of 802,800 acre-feet in 1992. In 1996, total groundwater discharge from the Edwards Aquifer was approximately 705,600 acre-feet. **Table 5.2** shows the monthly estimated discharge in 1996 for six primary Edwards Aquifer springs

While springflow can vary greatly from year to year and is dependent on precipitation and aquifer water levels, groundwater pumping has progressively increased since records have been maintained. The lowest estimated annual aquifer pumping level was 101,900 acre-feet, which was recorded in 1934. Since 1934, pumping from the Edwards Aquifer has increased more than 400 percent. Average annual well production is estimated to be 294,600 acre-feet per year for the period of record from 1934 to 1996, while the estimated floating 10-year average for pumping from 1987 to 1996 is 442,000 acre-feet. Groundwater pumping accounted for 493,600 acre-feet of water discharged from the Edwards Aquifer in 1996. **Figure 5.2** is a graph comparing groundwater withdrawal to springflow.

Table 5.3 shows the 1996 discharge data by use for the six counties in the region. **Table 5.4** shows annual estimated Edwards Aquifer groundwater discharge by use from 1955 to 1996.

Figure 5.1 Major springs in the San Antonio Area of the Edwards Aquifer.

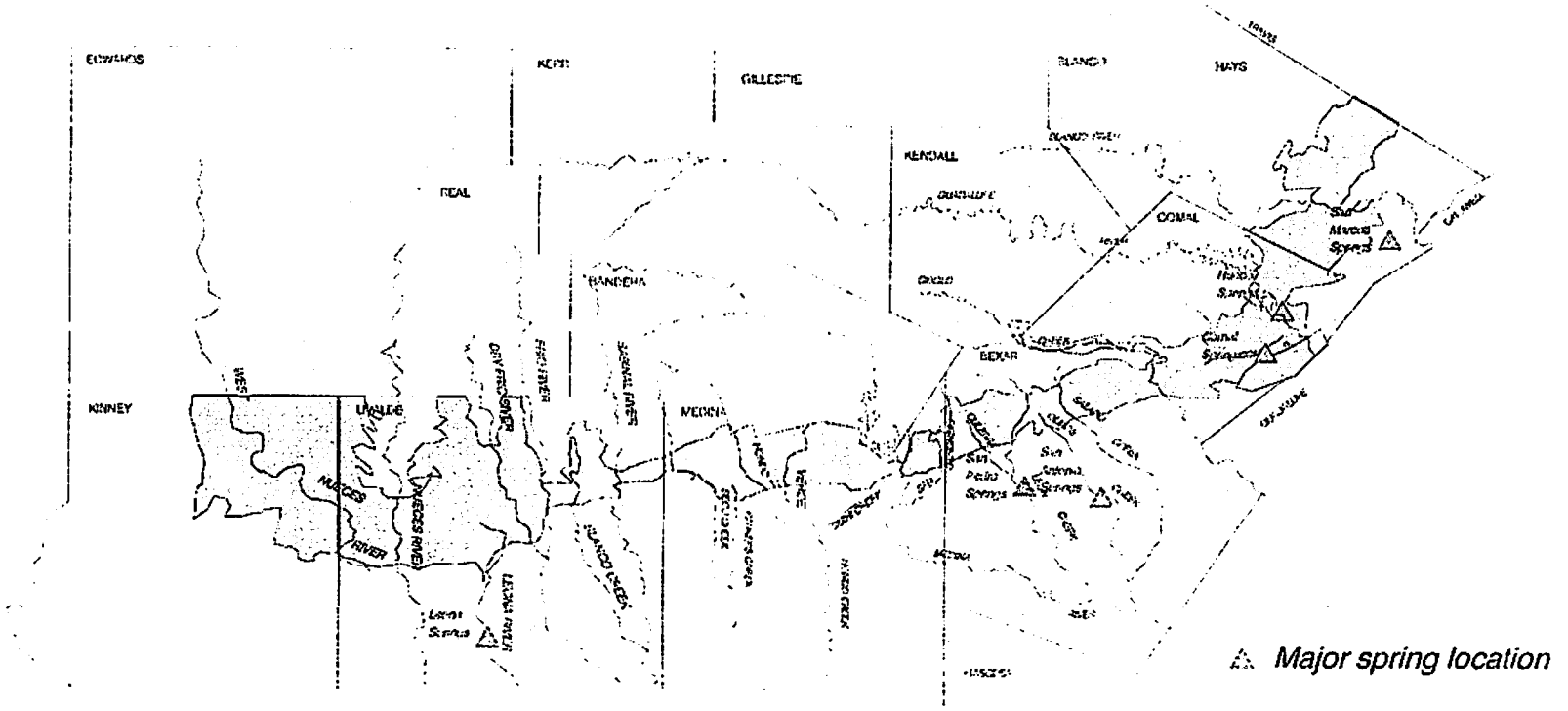


Table 5.1 Annual estimated groundwater discharge data by county for the Edwards Aquifer, 1934-1996 (Measured in thousands of acre-feet).

Year	Kinney, Uvalde	Medina	Bexar	Comal	Hays	Total	Total Wells	Total Springs
1934	12.6	1.3	109.3	229.1	85.6	437.9	101.9	336.0
1935	12.2	1.5	171.8	237.2	96.9	519.6	103.7	415.9
1936	26.6	1.5	215.2	261.7	93.2	598.2	112.7	485.5
1937	28.3	1.5	201.8	252.5	87.1	571.2	120.2	451.0
1938	25.2	1.6	187.6	250.0	93.4	557.8	120.1	437.7
1939	18.2	1.6	122.5	219.4	71.1	432.8	118.9	313.9
1940	16.1	1.6	116.7	203.8	78.4	416.6	120.1	296.5
1941	17.9	1.6	197.4	250.0	134.3	601.2	136.8	464.4
1942	22.5	1.7	203.2	255.1	112.2	594.7	144.6	450.1
1943	19.2	1.7	172.0	249.2	97.2	539.3	149.1	390.2
1944	11.6	1.7	166.3	252.5	135.3	567.4	147.3	420.1
1945	12.4	1.7	199.8	263.1	137.8	614.8	153.3	461.5
1946	6.2	1.7	180.1	261.9	134.0	583.9	155.0	428.9
1947	13.8	2.0	193.3	256.8	127.6	593.5	167.0	426.5
1948	9.2	1.9	159.2	203.0	77.3	450.6	168.7	281.9
1949	13.2	2.0	165.3	209.5	89.8	479.8	179.4	300.4
1950	17.8	2.2	177.3	191.1	78.3	466.7	193.8	272.9
1951	16.9	2.2	186.9	150.5	69.1	425.6	209.7	215.9
1952	22.7	3.1	187.1	133.2	78.8	424.9	215.4	209.5
1953	27.5	4.0	193.7	141.7	101.4	468.3	229.8	238.5
1954	26.6	6.3	208.9	101.0	81.5	424.3	246.2	178.1
1955	28.3	11.1	215.2	70.1	64.1	388.8	261.0	127.8
1956	59.6	17.7	229.6	33.6	50.4	390.9	321.1	69.8
1957	29.0	11.9	189.4	113.2	113.0	456.5	237.3	219.2
1958	23.7	6.6	199.5	231.8	155.9	617.5	219.3	398.2
1959	43.0	8.3	217.5	231.7	118.5	619.0	234.5	384.5
1960	53.7	7.6	215.4	235.2	143.5	655.4	227.1	428.3
1961	56.5	6.4	230.3	249.5	140.8	683.5	228.2	455.3
1962	64.6	8.1	220.0	197.5	98.8	589.0	267.9	321.1
1963	51.4	9.7	217.3	155.7	81.9	516.0	276.4	239.6
1964	49.3	8.6	201.0	141.8	73.3	474.0	260.2	213.8
1965	46.8	10.0	201.1	194.7	126.3	578.9	256.1	322.8
1966	48.5	10.4	198.0	198.9	115.4	571.2	255.9	315.3
1967	81.1	15.2	239.7	139.1	82.3	557.4	341.3	216.1
1968	58.0	9.9	207.1	238.2	146.8	660.0	251.7	408.3
1969	88.5	13.6	216.3	218.2	122.1	658.7	307.5	351.2
1970	100.9	16.5	230.6	229.2	149.9	727.1	329.4	397.7
1971	117.0	32.4	262.8	168.2	99.1	679.5	406.8	272.7
1972	112.6	28.8	247.7	234.3	123.7	747.1	371.3	375.8
1973	96.5	14.9	273.0	289.3	164.3	838.0	310.4	527.6
1974	133.3	28.6	272.1	286.1	141.1	861.2	377.4	483.8
1975	112.0	22.6	259.0	296.0	178.6	868.2	327.8	540.4
1976	136.4	19.4	253.2	279.7	164.7	853.4	349.5	503.9
1977	156.5	19.9	317.5	295.0	172.0	960.9	380.6	580.3
1978	154.3	38.7	269.5	245.7	99.1	807.3	431.8	375.5
1979	130.1	32.9	294.5	300.0	157.0	914.5	391.5	523.0
1980	151.0	39.9	300.3	220.3	107.9	819.4	491.1	328.3
1981	104.2	26.1	280.7	241.8	141.6	794.4	387.1	407.3
1982	129.2	33.4	305.1	213.2	105.5	786.4	453.1	333.3
1983	107.7	29.7	277.6	186.6	118.5	720.1	418.5	301.6
1984	156.9	46.9	309.7	108.9	85.7	708.1	529.8	178.3
1985	156.9	59.2	295.5	200.0	144.9	856.5	522.5	334.0
1986	91.7	41.9	294.0	229.3	160.4	817.3	429.3	388.0
1987	94.9	15.9	326.6	286.2	198.4	922.0	364.1	557.9
1988	156.7	82.2	317.4	236.5	116.9	909.7	540.0	369.7
1989	156.9	70.5	305.6	147.9	85.6	766.5	542.4	224.1
1990	118.1	69.7	276.8	171.3	94.1	730.0	489.4	240.6
1991	76.6	25.6	315.5	221.9	151.0	790.6	436.0	354.6
1992	76.5	9.3	370.5	412.4	261.3	1130.0	327.2	802.8
1993	107.5	17.8	371.0	349.5	151.0	996.7	407.3	589.4
1994	95.5	41.1	297.7	269.8	110.6	814.8	424.6	390.2
1995	90.8	35.2	*272.1	235.0	127.8	761.0	399.6	361.3
1996	117.6	66.3	286.8	150.2	84.7	705.6	493.6	212.0
For period of record 1934-1996:								
Average	69.8	18.5	234.9	217.9	117.3	658.3	294.8	363.5
Median	58.0	10.4	217.5	229.3	113.0	619.0	267.9	369.7
For period of record 1987-1996 (10 years):								
Average	109.1	43.4	314.0	248.1	138.1	852.7	442.4	410.3
Median	101.5	38.2	310.6	235.8	122.4	802.7	430.3	365.5

Differences may occur due to rounding procedures.

* The USGS revised the method of calculating domestic/livestock pumping, which significantly decreased the estimate for 1996.

Data source: USGS, 1996.

Table 5.2 Estimated spring discharge from the Edwards Aquifer, 1996 (Measured in acre-feet).

Month	Comal Springs	San Marcos Springs	Hueco Springs	San Antonio Springs	San Pedro Springs	Leona Springs and Leona Springs Underflow	Total monthly discharge combining all springs
Jan.	16,250	7,180	386	0	189	2,010	26,015
Feb.	13,690	6,170	223	0	42	1,610	21,735
March	13,710	6,620	210	0	0	1,450	21,990
April	12,380	6,020	175	0	0	1,010	19,585
May	10,200	6,120	146	0	0	521	16,987
June	6,800	5,610	98	0	0	387	12,895
July	5,720	5,190	35	0	0	383	11,328
Aug.	6,000	4,980	249	0	0	385	11,614
Sept.	9,010	6,500	731	0	0	465	16,706
Oct.	10,140	6,630	880	0	0	480	18,130
Nov.	10,100	5,510	484	0	0	568	16,662
Dec.	11,760	5,600	236	0	0	701	18,297
Total	**125,760**	**72,130**	**3,853**	**0**	**231**	**9,970**	**211,944**

Differences may occur due to rounding procedures.
Data source: USGS, 1996.

Figure 5.2 Groundwater pumping compared to springflow in the Edwards Aquifer, 1934-1996.

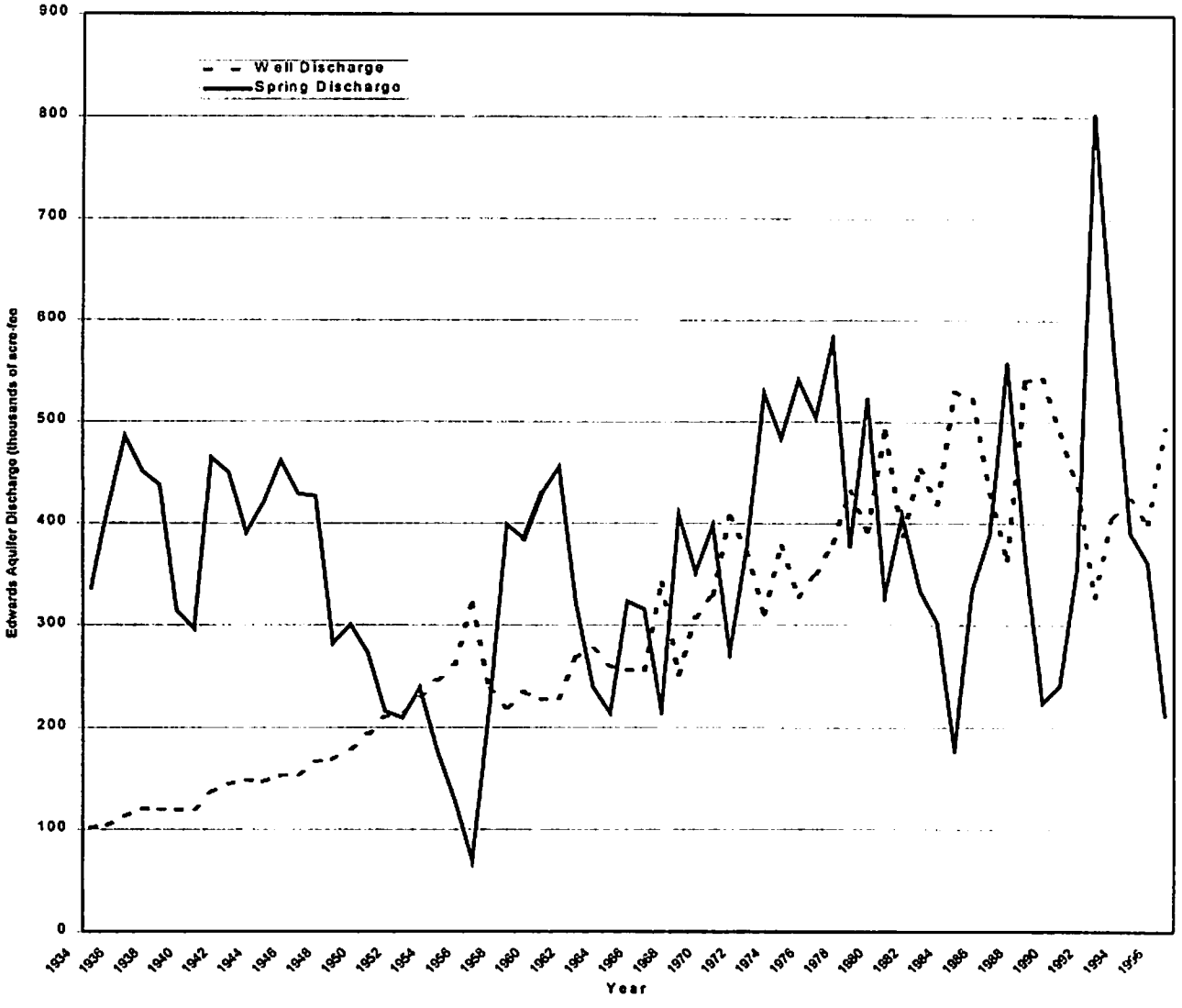


Table 5.3 Total groundwater discharge from the Edwards Aquifer, 1996 (Measured in thousands of acre-feet).

County	Irrigation	Municipal/ Military	Domestic/ Stock	Industrial	Springs	Total
Bexar	24.1	233.5	8.2	21.2	0.2	286.8
Comal	0.2	3.6	0.2	16.5	129.8	150.2
Hays	0.1	11.3	0.7	0.6	72.3	84.7
Medina	58.9	6.7	0.8	--	--	66.3
Uvalde	97.7	5.5	2.1	0.6	10.0	115.7
Kinney	0.6	1.0	0.3	--	--	1.9
Total	**181.3**	**261.3**	**12.3**	**38.8**	**212.0**	**705.6**

Differences may occur due to rounding procedures.
Data source: USGS, 1996.

Table 5.4 Annual estimated Edwards Aquifer groundwater discharge by use, 1955-1996 (Measured in thousands of acre-feet).

Year	Irrigation	Municipal	Domestic/ Stock	Industrial/ Commercial	Springs
1955	85.2	120.5	30.1	25.1	127.8
1956	127.2	138.3	28.9	22.4	69.8
1957	68.8	116.1	29.8	22.6	219.2
1958	47.2	113.7	33.4	25.1	398.2
1959	60.0	118.9	31.5	24.2	384.5
1960	54.9	121.1	29.1	23.3	428.3
1961	52.1	124.5	29.6	22.2	455.3
1962	72.7	143.7	28.8	22.8	321.1
1963	75.4	151.8	27.8	21.8	239.6
1964	72.6	140.2	26.3	21.7	213.8
1965	68.0	138.8	27.0	22.3	322.8
1966	68.2	141.8	23.3	22.6	315.3
1967	119.4	171.0	25.1	25.8	216.1
1968	59.3	146.9	25.5	20.0	408.3
1969	95.2	162.0	29.2	21.1	351.2
1970	110.1	167.5	29.3	22.5	397.7
1971	159.4	196.2	28.6	22.6	272.7
1972	128.8	190.5	30.8	21.1	375.8
1973	82.2	177.1	32.3	18.8	527.6
1974	140.4	174.6	33.5	15.1	483.3
1975	96.4	182.5	33.6	15.3	540.4
1976	118.2	182.1	34.6	14.7	503.9
1977	124.2	205.3	38.1	13.0	580.3
1978	165.8	214.2	40.3	11.5	375.5
1979	126.8	208.9	40.7	15.2	523.0
1980	177.9	256.2	43.3	13.7	328.3
1981	101.8	231.8	40.9	12.6	407.3
1982	130.0	268.6	39.5	15.0	333.3
1983	115.9	249.2	38.8	14.7	301.5
1984	191.2	287.2	36.2	15.2	178.3
1985	203.1	263.7	39.2	16.5	334.0
1986	104.2	266.3	42.0	16.8	388.0
1987	40.9	260.9	43.5	18.7	557.9
1988	193.1	286.2	41.9	18.8	369.7
1989	196.2	285.2	38.2	22.9	224.1
1990	172.9	254.9	37.9	23.7	240.6
1991	88.5	240.5	39.5	67.5	354.6
1992	27.1	236.5	34.8	29.0	802.8
1993	69.3	252.0	49.9	36.1	589.4
1994	104.5	247.0	33.9	39.3	390.2
1995	95.6	255.0	*11.6	37.3	361.3
1996	181.3	261.3	*12.3	38.8	212.0
Average 1955-96	108.9	198.8	33.1	22.6	367.3
Median 1955-96	103.0	193.4	33.5	22.0	365.5
Average 1987-96	116.9	258.0	34.4	33.2	410.3
Median 1987-96	100.1	255.0	38.1	32.6	365.5

Differences may occur due to rounding procedures.
* The USGS revised the method of calculating domestic/livestock pumpage, which significantly decreased the estimate for 1995 and 1996.
Data source: USGS and Edwards Aquifer Authority, 1996.

6.0 WATER QUALITY

The Authority, in cooperation with the USGS and the Texas Water Development Board (TWDB), has conducted a systematic program of water-quality data collection since 1968. Through this cooperative effort, the Authority (and the EUWD) has maintained a network of monitoring wells and surface water sites for gathering water-quality data across the entire area of the Edwards Aquifer. Analyses of these data have been used by the Authority to monitor changes in aquifer water quality. A bulletin has been published annually to report the results from the sample analyses obtained from the data collection network.

In 1996, the Authority collected water quality samples from 76 wells and three springs. The locations of these wells and springs are shown in **Plate 6.1**. These samples were analyzed in the field for selected water-quality properties and in the laboratory for both inorganic and organic chemical constituents. The field analysis includes temperature, pH, specific conductance and alkalinity. The laboratory analyses includes common major ions, minor elements (metals, including heavy metals), nutrients, pesticides, herbicides, volatile organic compounds and other selected analytes. A detailed list of constituents and their typical concentrations in groundwater are listed in **Table 6.1**.

In 1996, 44 wells in the Edwards Aquifer were sampled and analyzed for the occurrence of minor elements (metals). Laboratory analyses indicated several wells contained minor element concentrations slightly above the minimum analytical detection limit (MDL) for these constituents. However, these data have been documented by the testing laboratory under detection limits set through duplication of analytical methods to obtain reasonable confidence levels. Concentrations slightly above MDLs are not considered to be reproducible quantitative values and must be viewed with a degree of caution. The American Chemical Society has defined the limit of detection of any analyte concentration to be three times the standard deviation of a mean blank signal, and goes further to define the limit of quantification to be 10 times the standard deviation before the result can be considered as a quantifiable and reproducible value (Analytical Chemistry, vol. 52, no. 14, 1980). The analytical values in the subject wells are extremely low in magnitude, and in no case were any of these parameters more than 20 percent of the maximum contaminant level (MCL). These analytical values all correspond to typical aquifer results for trace element content, as seen in **Table 6.1**.

In 1996, 16 wells in the Edwards Aquifer were sampled and analyzed for organochlorine and organophosphate pesticides. Each well was tested for up to 20 pesticides at analytical detection levels below those of the MCLs posted by the U.S. Environmental Protection Agency (EPA) in the National Primary Drinking Water Regulations. No pesticides were observed at or above the MDL for any of the wells sampled during the 1996 water-quality study.

MCLs for nine volatile organic compounds are given in **Table 6.2**. MCLs are established by the EPA and are enforceable federal standards. While these levels are detectable, they are well below the limits set by current EPA drinking water standards. Volatile organic sampling in 1996 consisted of 18 wells distributed in all five counties. With one exception, the samples showed no detectable levels of any volatile organic compounds. Well YP-69-51-114 measured a tetrachloroethylene (PCE) concentration of 6 µg/L (micrograms per liter). The MDL for this constituent is 0.2 µg/L and the MCL is 5 µg/L. This well is out of service as a public-supply well and is part of a current investigation by the Texas Natural Resource Conservation Commission (TNRCC).

In 1996, 18 wells were sampled and analyzed for 3 chlorphenoxy herbicides, (2. 4-D; 2. 4, 5-T; and 2,4,5-TP (Silvex)). The samples showed no detectable levels of any of these compounds.

Table 6.1 Groundwater quality standards.

Parameter	Current Maximum or Secondary Contaminant Levels	Edwards Aquifer Typical Range of Results
Laboratory Parameters:		
pH	6.5-8.5*	6.5-8.0
Hardness (mg/L)	-	250-300
Non-carbonate hardness	-	20-50
Dissolved Solids (mg/L)	500*	250-450
Major Ions:		
Calcium (Ca) (mg/L)	-	80-120
Magnesium (Mg) (mg/L)	-	10-20
Sodium (Na) (mg/L)	-	3-10
Potassium (K) (mg/L)	-	1-2
Bicarbonate (CO_3)	-	250-400
Carbonate (CO3) (mg/L)	-	0
Sulfate (SO4) (mg/L)	250*	10-30
Chloride (Cl) (mg/L)	250*	10-30
Fluoride (F) (mg/L)	4	0.1-0.5
Silica (SiO2) (mg/L)	-	10-20
Nutrients:		
Total Nitrate Nitrogen (mg/L)	10	0-0.1
Total Nitrite Nitrogen (mg/L)	-	0-0.1
Total Ammonia Nitrogen (mg/L)	0.5	0-0.1
Total Phosphorus (mg/L)	-	0-0.1
Microbiological Parameters:		
Biochemical Oxygen Demand	-	0-1
Total Organic Carbon	-	1-5
Detergents (MBAS)	-	0-0.1
Total Coliform (cols/100ml)	10,000 (raw water for drinking water supplies)	0-5,000
Fecal Coliform (cols/100ml)	2,000 (raw water for drinking water supplies)	0-150
Fecal Streptococci (cols/100ml)	-	0-100
Minor Elements (Metals):		
Arsenic (As) (µg/L)	50	0-2
Cadmium (Cd) (µg/L)	5	0-1
Chromium (Cr) (µg/L)	100	0-15
Copper (Cu) (µg/L)	1000*	0-40
Iron (Fe) (µg/L)	300*	0-500
Lead (Pb) (µg/L)	50	0-10
Manganese (Mn) (µg/L)	50*	0-50
Mercury (Hg) (µg/L)	2	0-1.5
Zinc (Zn) (µg/L)	5000*	0-2000
Nickel (Ni) (µg/L)	100	0-4
Pesticides:		
Aldrin (µg/L)	1	0
Chlordane (µg/L)	3	0
DDD (µg/L)	-	0
DDE (µg/L)	-	0
DDT (µg/L)	50	0
Heptachlor (µg/L)	0.4	0
Heptachlor epoxide (µg/L)	0.2	0
Lindane (µg/L)	0.2	0
Mirex (µg/L)	-	0
Diazinon (µg/L)	-	0
Ethion (µg/L)	-	0
Malathion (µg/L)	-	0
Methyl Parathion (µg/L)	-	0
Methyl Trithion (µg/L)	-	0
Parathion (µg/L)	-	0
Trithion (µg/L)	-	0

Table 6.1 (Cont'd)

Parameter	Current Maximum or Secondary Contaminant Levels	Edwards Aquifer Typical Range of Results
Pesticides (cont'd)		
PCB (µg/L)	0.5	0
Endosulfan (µg/L)	-	0
Ethyl trithion (µg/L)	-	0
Perthane (µg/L)	-	0
Toxaphene (µg/L)	3	0
Herbicides		
2, 4-D (µg/L)	70	0
2, 4, 5-T (µg/L)	2	0
2, 4, 5-TP (Silvex) (µg/L)	50	0

"--" indicates no applicable maximum or secondary contaminant level.
* Secondary maximum contaminant level.
Data source: USEPA maximum contaminant levels, 40 CFR, Part 141& Part 143, 1995.

Table 6.2 Volatile organic compounds.

Contaminant	Maximum Contaminant Level	Edwards Aquifer Typical Results
1,1,1-Trichloroethane (µg/L)	200	0
1,1,2-Trichloroethane (µg/L)	5	0
1,2-Dichloroethane (µg/L)	5	0
1,2-Dichloropropane (µg/L)	5	0
1,1-Dichloroethylene (µg/L)	7	0
1,2,4-Trichlorobenzene (µg/L)	70	0
Benzene (µg/L)	5	0
Carbon tetrachloride (µg/L)	5	0
cis-1,2-Dichloroethylene	70	0
Dichloromethane (µg/L)	5	0
Ethylbenzene (µg/L)	700	0
Monochlorobenzene (µg/L)	100	0
o-Dichlorobenzene (µg/L)	600	0
Para-Dichlorobenzene (µg/L)	75	0
Styrene (µg/L)	100	0
Tetrachloroethylene (µg/L)	5	0
Toluene (µg/L)	1000	0
trans-1,2-Dichloroethylene (µg/L)	100	0
Trichloroethylene (µg/L)	5	0
Vinyl Chloride (µg/L)	2	0
Xylenes, total (mg/L)	10	0

Data source: USEPA maximum contaminant levels, 40 CFR , Part 141, 1995.

Overall, results of the 1996 water-quality sampling and analysis program illustrate the continued excellent quality of water in the Edwards Aquifer. The classification of groundwater quality is based on the concentration of minerals dissolved in water, termed total dissolved solids (TDS), as shown in **Table 6.3**.

Table 6.3 Classification of groundwater quality based on total dissolved solids.

Description	TDS Concentration (mg/L)
Fresh	Less than 1,000
Slightly saline	1,000 to 3,000
Moderately saline	3,000 to 10,000
Very saline	10,000 to 35,000
Brine	More than 35,000

Source: Winslow and Kister, 1956.

Freshwater/Saline-water Interface Study

A transitional interface exists between the freshwater zone and the downdip, saline-water zone. A line of 1,000 mg/L dissolved-solids concentrations defines an arbitrary boundary between the freshwater zone and the saline-water zone. Locally this line is referred to as the freshwater/saline-water interface (or "bad-water line"), which defines the farthest downdip extent of potable water (Pavilicek and others, 1987). The freshwater/saline-water interface is shown in **Plates 2.1, 3.1 and 6.1.**

South and southeast of the interface, water from the aquifer is slightly to moderately saline, and contains moderate to large concentrations of dissolved chloride and sulfate. The interface varies both laterally and vertically, as determined in several wells near the boundary. Water from some wells north of the interface and from all wells south of the interface contain hydrogen sulfide gas. In most wells along the interface, freshwater has been encountered in the upper portion and saline water in the lower portion of the Edwards Aquifer (Groschen, 1993; Reeves, 1971). Other wells along the interface have encountered the opposite vertical distribution, with saline-water zones overlying freshwater zones, particularly in the southern area of Medina County (J.R. Waugh, oral communication, 1997).

In 1985, a research study of the freshwater/saline-water interface was begun by the EUWD in cooperation with the USGS, TWDB and the San Antonio Water System (SAWS). A series of seven wells were drilled in the San Antonio area that transect the freshwater/saline-water interface to detect changes in water quality as hydraulic head in the aquifer changes. This program was started in response to the concern that increased aquifer withdrawals might result in encroachment of saline water into the aquifer freshwater zone. As part of the water-quality program, monthly and other periodic samples have been collected and analyzed. Other samples are collected when certain spring-discharge criteria are met.

The possibility of saline-water encroachment and subsequent deterioration of water quality in the aquifer led to the subsequent construction of two additional water-quality monitor well transects across the freshwater/saline-water interface. The monitor wells were drilled and tested by the Authority and the USGS with the cooperation of local entities. These transects are located in the New Braunfels and San Marcos, Texas areas (Poteet and others, 1992). All transect wells maintained relatively constant values of water quality with no significant changes.

During the period of study (1986 – present) the data indicate that normal changes in the aquifer water level have little effect on the water quality in theses wells which are directly adjacent to the freshwater / saline-water interface.

Miscellaneous Water-Quality Constituents and Standards

During the 1996 water-quality study, the San Antonio area of the Edwards Aquifer was exposed to a drought of near-record proportions as evidenced by decreased precipitation and spring-discharge data. The Authority took additional water-quality samples from selected wells and springs when the Comal Springs discharge fell below 150 cubic feet per second (cfs). This data is included in **Appendix B**. An analysis of the 1996 water-quality study may be issued as a separate report.

Since 1968, the Authority and the EUWD, in cooperation with the USGS, have monitored water quality in the Edwards Aquifer. Water-quality data from these monitoring activities have been presented in various bulletins and reports with detectable concentrations of certain contaminants noted. A short background on several of these contaminants and their significance and potential health effects follows.

Lead - Lead is a highly toxic metal. Exposure to lead in high concentrations can cause anemia, kidney damage and mental retardation. High levels of lead in the blood can delay physical and mental development in infants, and can impair mental abilities in children. It is also classified by the EPA as a probable human carcinogen.

Lead occurs in drinking water primarily as a result of corrosion of pipes and other plumbing materials. Lead levels are monitored in public drinking water systems on a regular basis by the TNRCC. The minimum detection limit for lead in water quality sample analysis is 0.01 µg/L, and the maximum contaminant level (MCL) is 15 µg/L. Detectable concentrations of lead in Edwards wells are predominantly found in or near the saline portion of the aquifer, where corrosion of casing and pumping equipment occurs rapidly. Lead has also been detected in monitor wells adjacent to closed landfills and industrial sites. As of 1996, no significant recurring levels of lead exceeding the MCL have been found in the Edwards Aquifer region.

Mercury - Mercury is known to cause damage to the central nervous system, and is a known human carcinogen. It occurs naturally in groundwater associated with highly mineralized fluids in the vicinity of volcanic activity, or due to geothermal heating of deep brines. Mercury is also used in some batteries, paints, pesticides and electrical components, and therefore can possibly be detected in the vicinity of landfills and manufacturing sites that produced these items. The MCL for mercury is 2 µg/L. The minimum detection limit is 0.01 µg/L. The primary occurrences of detectable concentrations of mercury have been found in saline-water wells and monitor wells used to investigate abandoned landfills and industrial sites in Bexar County. No detectable concentrations of mercury were measured during the 1996 sampling program.

Volatile Organic Compounds (VOCs) - At least five of the chemicals on this list are known or suspected carcinogens when ingested by humans. These include benzene, carbon tetrachloride, 1,2-dichloroethane, trichloroethylene (TCE), and vinyl chloride. *Several other VOCs* are regulated based on chronic toxicity.

These chemicals are commonly used as industrial solvents. Because of their toxicity, MCLs for these contaminants are very low, ranging from 2 to 5 µg/L for most of the VOCs. Minimum detection levels for VOCs predominantly range from 0.01 to 0.03 µg/L. Occurrences of significant detectable concentrations of VOCs have been uncommon in the Edwards Aquifer. Specific sites of former industries and landfills in Uvalde and Bexar counties have been investigated by the Authority, as well as other local, state and federal agencies. No new reported instances of VOC contamination were investigated by Authority staff during 1996.

Secondary Drinking Water Standards - These standards are nonenforceable and are set for contaminants that may affect the aesthetic qualities of drinking water, such as odor or appearance. **Table 6.4** is a list of the current secondary standards. While these contaminants are not considered to affect public health, their presence can result in an adverse effect on public welfare.

Table 6.4 Secondary drinking water standards.

Contaminant	Secondary Maximum Contaminant Level (SMCL)(mg/L)
Aluminum	0.05-0.2
Chloride	250
Color	15 color units
Corrosivity	Non-corrosive
Fluoride	2.0
Iron	0.3
Manganese	0.05
pH	6.5-8.5
Silver	0.10
Sulfate	250
Total Dissolved Solids (TDS)	500
Zinc	5

Data source: USEPA, 40 CFR, Part 143, 1995.

The Edwards Aquifer Authority's water-quality monitoring program will continue to monitor for these contaminants as well as many others in order to detect and investigate any occurrences of possible contamination to the aquifer. The Authority continues its programs to protect the water quality of the aquifer through investigating groundwater contamination, identifying and analyzing anomalous data from the Authority's aquifer-wide sampling program, diligently monitoring development activities over the EARZ, and locating and causing abandoned wells to be plugged. All of these programs are intended to ensure that the water in the Edwards Aquifer will remain at its current, excellent quality.

Surface Water-Quality Data

Surface water-quality data is collected within the catchment area at stations upstream of the EARZ. The surface water data-collection sites are located within the seven major stream basins that flow across the western portion of the EARZ. These include from west to east, the Nueces River, Dry Frio River, Frio River, Sabinal River, Seco Creek, Hondo Creek and Medina

River. Data from this network of data-collection sites can be used as a base level to evaluate the quality of water recharging the aquifer and the sensitivity of water quality resulting from land use in various areas of the Edwards Aquifer region. Locations of data collection sites are illustrated in **Plate 6.1**. Laboratory analyses of the samples collected in 1996, as seen in Appendix B, indicate no evidence of detectable concentrations of pesticides, herbicides, volatile organic compounds, or other constituents or parameters in excess of typical standards.

Surface water-quality data for the stream basins in the eastern portion of the EARZ were not collected during the 1996 water-quality study. It is proposed that data collection sites be established in this region of the EARZ and may possibly include Helotes Creek, Salado Creek, Cibolo Creek, Dry Comal Creek and the Blanco River. As rapid urban and suburban development occurs on the eastern portion of the EARZ, the need for surface water quality monitoring in this area will increase.

7.0 SUMMARY

The average estimated annual groundwater recharge to the Edwards Aquifer in the San Antonio area from 1934 through 1996 was 668,700 acre-feet. Recharge in 1996 was 324,300 acre-feet, which was well below the regional average. The lowest annual recharge of 43,700 acre-feet occurred in 1956, and the highest annual recharge of 2,486,000 acre-feet occurred in 1992.

The estimated annual discharge from the Edwards Aquifer through wells and springs in 1996 was 705,600 acre-feet. The lowest annual discharge through wells and springs was 388,800 acre-feet, which occurred in 1955.

Water-level data during 1996 reflected a general decrease in water recharging the aquifer and an increase in pumping during the year.

Results of the Authority's 1996 water-quality monitoring program illustrate the continued excellent quality of water in the Edwards Aquifer. In 1996, the Authority collected water-quality samples from wells, springs and stream basins, which were analyzed for major ions, minor elements, pesticides, herbicides, volatile organics/aromatics and nutrients. Laboratory analyses of well samples indicated no detectable levels of any volatile organic compounds. Laboratory analyses of samples from several wells contained minor element concentrations slightly above the minimum analytical detection limit for these constituents, but these values are extremely low in magnitude. Laboratory analyses of the surface water samples collected in 1996 indicated no evidence of detectable concentrations of pesticides, VOCs or other constituents or parameters in excess of typical standards.

8.0 DEFINITIONS

Technical terms and abbreviations used in this report are defined as follows:

Acre-foot (ac-ft) — The quantity of water required to cover one (1) acre to a depth of one (1) foot and is equivalent to 43,560 ft^3 (cubic feet), about 325,900 gal (gallons), or 1,233 m^3 (cubic meters).

Aquifer — A body of rock that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

Artesian well — A well tapping confined groundwater. Water in the well rises above the level of the confined water-bearing strata under artesian pressure but does not necessarily reach the land surface.

Artesian zone — An area where the water level from a confined aquifer stands above the top of the strata in which the aquifer is located.

Bacteria — Microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped in colonies. Some bacteria cause disease while others perform an essential role in nature in the recycling of materials. (Measured in colonies/100 ml).

Conductance — Also called Specific Electrical Conductance and Conductivity. A measure of the ease with which an electrical current can be caused to flow through an aqueous solution under the influence of an applied electric field. Generally in water, the higher the total dissolved solids, the higher the electrical conductivity. (Measured in microsiemens/centimeter (µS/cm) at 25°C).

Confined aquifer — An artesian aquifer or an aquifer bound above and below by impermeable strata, or by strata with lower permeability than the aquifer itself.

Discharge — The volume of water that passes a given point within a given period of time.

Drainage basin — A part of the earth's surface that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Edwards Underground Water District	The regional governmental entity that preceded the Edwards Aquifer Authority.
Freshwater/ saline-water interface	The interface or area that separates TDS values less than 1,000 mg/L (freshwater) from TDS values greater than 1,000 mg/L (saline-water). Commonly referred to as the "bad water line."
Gaging station	A particular site that systematically collects hydrologic data such as streamflow, springflow or precipitation.
Groundwater Divide	A ridge in the water table or other potentiometric surface from which the ground water represented by that surface moves away in both directions.
Micrograms per liter (UG/L, µg/L)	A unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. 1,000 micrograms per liter is equal to 1 milligram per liter.
Milligrams per liter (Mg/L,mg/L)	A unit for expressing the concentration of chemical constituents in solution as mass (milligrams) of solute per unit volume (liter) of water. 1,000 milligrams per liter is equal to 1 gram per liter.
Potentiometric surface	An imaginary surface representing the total head of groundwater and defined by the level that water will rise in a well.
Real Time Data	Instantaneous or near instantaneous information used to monitor a current condition such as precipitation, stream flow, spring discharge, etc.
Recharge	The process involved in absorption and addition of water to the zone of saturation.
Recharge zone	The area in which water infiltrates into the ground and eventually reaches the zone of saturation in one or more aquifers.
Specific conductance	A measure of the ability of water to conduct an electrical current. Expressed in micro-siemens per centimeter (µS/cm) at 25°C.
Ten-year floating average	The calculated mean of the current year plus the previous nine years in a graph.
Total Dissolved Solids (TDS)	The concentration of dissolved minerals in water, expressed in units of milligrams per liter (mg/l).

Transect wells — A group of water quality monitoring wells located at particular a site positioned to monitor water-quality changes, such as across the freshwater/saline-water interface.

Unconfined aquifer — An aquifer, or a portion of an aquifer, with a water table and containing groundwater that is not under pressure beneath relatively impermeable rocks.

Underflow — The movement of water flowing beneath the bed or alluvial plain of a surface stream.

Water table — The interface between the zone of saturation and the zone of aeration where the surface pressure of unconfined groundwater is equal to the atmospheric pressure.

Water level observation well — A water well used to measure the water level or potentiometric surface of water-bearing strata such as the Edwards Aquifer, Leona Gravel Aquifer, and Lower Glen Rose (Trinity) Aquifer.

Zone of aeration — The subsurface zone where the voids and pore spaces are filled with water under less pressure than that of the atmosphere and air.

Zone of saturation — The subsurface zone in which all voids and pore spaces are filled with water under pressure greater than that of the atmosphere.

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APPENDIX A – Water-Level Data

Table A-1 Bracken well (DX-68-30-208) daily high water levels (in feet above MSL), 1996.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec
1	652.6	651.7	645.6	646.1	640.7	633.5	F/S	F/S	628.8	N/D	636.83	639.53
2	654.5	651.6	N/D	646.0	640.8	633.7	F/S	F/S	628.8	N/D	636.83	639.56
3	654.4	651.5	N/D	645.9	640.6	634.2	F/S	F/S	629.0	N/D	636.72	640
4	654.3	651.3	N/D	645.7	640.5	634.3	F/S	F/S	629.0	N/D	636.73	640.07
5	654.2	651.3	646.8	646.0	639.9	634.3	F/S	674.4	F/S	N/D	636.82	640.21
6	654.1	651.2	646.8	646.4	639.4	634.3	F/S	627.5	F/S	N/D	636.77	640.37
7	654.0	651.0	646.8	646.7	639.3	633.3	F/S	627.5	F/S	N/D	636.74	640.37
8	653.9	650.7	646.7	646.8	639.2	633.6	F/S	627.5	F/S	637.52	636.88	640.34
9	653.9	650.3	646.8	646.5	639.3	633.8	F/S	627.6	F/S	637.36	637.04	640.46
10	653.8	650.1	646.9	646.2	639.1	633.7	F/S	627.7	634.6	637.12	636.94	640.53
11	653.7	649.7	646.8	645.8	639.1	633.3	F/S	626.7	634.7	637.15	636.91	640.51
12	653.7	649.5	646.8	645.7	639.5	632.5	F/S	626.5	634.7	637.09	636.81	640.45
13	653.6	649.3	646.8	645.4	639.4	631.7	F/S	626.5	634.8	636.81	636.78	640.42
14	653.6	649.0	646.6	645.0	639.3	631.3	F/S	626.5	635.0	636.63	636.74	640.52
15	653.6	648.6	646.4	644.5	638.8	631.1	F/S	626.5	635.6	636.63	636.95	640.59
16	653.4	648.2	646.2	644.3	638.5	F/S	F/S	626.5	635.9	636.66	637.19	640.66
17	653.5	648.0	646.2	644.1	637.7	F/S	F/S	639.4	636.0	636.59	637.28	641.34
18	653.3	647.8	646.0	643.7	637.3	F/S	F/S	639.3	636.0	636.53	637.55	641.27
19	653.1	647.7	645.9	643.2	636.7	F/S	F/S	638.8	636.0	636.64	637.73	641.11
20	653.1	647.1	645.8	643.1	636.1	F/S	F/S	638.5	636.2	636.49	637.8	641.08
21	653.0	646.6	645.8	642.8	635.9	F/S	F/S	637.7	636.3	636.35	637.73	641.31
22	653.0	646.1	645.6	642.5	635.5	F/S	F/S	637.3	636.3	636.37	637.78	641.38
23	652.9	645.7	645.5	642.8	635.1	F/S	F/S	636.7	636.2	636.4	638.01	641.44
24	652.7	645.4	645.6	642.8	F/S	F/S	F/S	636.1	636.2	636.49	637.96	641.35
25	652.6	645.3	645.4	642.6	F/S	F/S	F/S	635.9	637.3	636.71	638.05	641.59
26	652.5	645.1	645.7	641.9	F/S	F/S	F/S	635.5	637.6	636.75	638.12	641.8
27	652.2	645.0	646.0	641.6	F/S	F/S	F/S	635.1	637.6	636.55	638.6	641.71
28	652.2	645.1	646.3	641.5	F/S	F/S	F/S	628.8	637.6	636.64	639.05	641.7
29	652.2	645.4	646.4	640.6	F/S	F/S	F/S	628.8	637.6	636.79	639.29	641.68
30	651.9		646.5	640.6	633.4	F/S	F/S	628.8	637.6	636.79	639.41	641.66
31	651.7		646.4		633.4		F/S	628.8		636.73		641.66

Table A-2 Landa Park well (DX-68-23-302) daily high water levels (in feet above MSL), 1996.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct	Nov	Dec.
1	625.2	N/D	N/D	N/D	N/D	622.3	621.6	621.6	622.4	N/D	623.0	623.4
2	625.3	N/D	N/D	N/D	N/D	622.4	621.6	621.6	622.5	N/D	623.0	623.4
3	625.3	N/D	N/D	N/D	N/D	622.4	621.5	621.6	622.5	N/D	623.0	623.4
4	625.2	N/D	N/D	624.1	N/D	622.5	621.6	621.5	622.5	N/D	623.0	623.4
5	625.2	N/D	N/D	624.1	N/D	622.5	621.6	621.5	622.5	N/D	623.0	623.4
6	625.2	N/D	N/D	624.2	N/D	622.5	621.6	621.4	622.5	N/D	623.0	623.4
7	625.2	N/D	N/D	624.2	N/D	622.4	621.4	621.4	622.5	623.1	623.0	623.4
8	N/D	N/D	N/D	624.2	N/D	622.4	621.4	621.4	622.6	623.1	623.0	623.4
9	N/D	N/D	N/D	624.2	N/D	622.4	621.4	621.5	622.6	623.0	623.0	623.5
10	N/D	N/D	N/D	624.2	N/D	622.4	621.4	621.4	622.6	623.0	623.0	623.4
11	N/D	N/D	N/D	624.1	N/D	622.3	621.5	621.3	622.6	623.0	623.0	623.5
12	N/D	N/D	N/D	624.1	N/D	622.2	621.6	621.3	622.6	623.0	623.0	623.4
13	N/D	625.6	N/D	624.1	N/D	622.0	621.6	621.4	622.6	623.0	623.0	623.4
14	N/D	625.6	N/D	624.0	623.2	621.9	621.5	621.4	622.7	623.0	623.0	623.4
15	N/D	625.6	N/D	624.0	623.2	621.9	621.5	621.4	622.7	623.0	623.0	623.4
16	N/D	625.6	N/D	623.9	623.1	621.8	621.6	621.4	622.8	623.0	623.0	623.6
17	N/D	625.5	N/D	623.9	623.0	621.7	621.5	621.4	622.8	623.0	623.0	623.6
18	N/D	625.5	N/D	623.9	623.0	621.7	621.6	621.3	622.8	623.0	623.1	623.6
19	N/D	625.5	N/D	623.8	622.9	621.7	621.6	621.2	622.8	623.0	623.1	623.6
20	N/D	625.4	N/D	623.8	622.8	621.6	621.6	621.3	622.8	623.0	623.1	623.6
21	N/D	625.4	N/D	623.8	622.7	621.5	621.4	621.3	622.8	623.0	623.1	623.6
22	N/D	625.3	N/D	623.8	622.7	621.5	621.4	621.4	622.9	623.0	623.1	623.6
23	N/D	625.2	N/D	623.8	622.7	621.4	621.4	621.5	622.9	623.0	623.1	623.6
24	N/D	625.2	N/D	623.8	622.5	621.4	621.4	621.7	622.9	623.0	623.2	623.6
25	N/D	625.2	N/D	N/D	622.4	621.5	621.5	621.9	623.1	623.0	623.2	623.6
26	N/D	625.1	N/D	N/D	622.3	621.5	621.6	621.9	623.1	623.0	623.2	623.6
27	N/D	625.1	N/D	N/D	622.4	621.6	621.7	621.9	623.1	623.0	623.2	623.6
28	N/D	N/D	N/D	N/D	622.4	621.7	621.7	622.0	623.1	623.0	623.2	623.6
29	N/D	N/D	N/D	N/D	622.4	621.7	621.7	622.0	623.1	623.0	623.2	623.6
30	N/D		N/D	N/D	622.4	621.6	621.7	622.2	623.1	623.0	623.3	623.6
31	N/D		N/D		622.4		621.6	622.3			623.3	623.6

"F/S" indicates mechanical failure.
"N/D" indicates no data available.

Table A-3 City of Castroville well (TD-68-41-301) daily high water levels (in feet above MSL), 1996.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	693.0	687.2	F/S	680.3	F/S	653.7	652.7	F/S	664.4	669.4	N/D	F/S
2	692.7	686.9	684.1	680.1	F/S	653.9	653.0	658.9	664.8	669.4	N/D	F/S
3	692.7	686.6	684.1	680.1	F/S	657.8	653.1	658.9	665.2	669.3	N/D	F/S
4	692.7	686.4	684.1	679.9	F/S	658.4	653.3	658.9	665.4	669.2	N/D	F/S
5	692.4	688.2	684.1	679.7	F/S	658.6	653.7	658.8	665.7	667.8	N/D	F/S
6	692.3	688.1	684.1	680.2	F/S	658.5	653.9	658.5	666.1	668.0	N/D	F/S
7	692.0	687.3	684.1	680.7	F/S	658.3	654.1	658.5	666.3	668.1	N/D	F/S
8	691.9	686.8	684.1	680.8	666.0	659.1	654.4	658.2	666.5	668.1	668.16	F/S
9	692.0	686.0	684.1	680.8	666.1	F/S	654.7	658.2	668.7	668.1	668.36	F/S
10	692.1	F/S	684.1	680.7	666.1	F/S	654.8	658.3	666.2	668.0	668.41	F/S
11	692.1	F/S	684.1	680.6	667.2	658.4	F/S	658.2	666.4	668.0	668.3	F/S
12	691.8	F/S	684.1	680.4	664.8	656.9	F/S	657.9	666.5	667.9	668.22	F/S
13	691.7	F/S	680.4	680.2	665.0	655.6	F/S	657.8	666.6	667.8	668.25	F/S
14	691.7	F/S	680.3	679.9	664.9	654.7	F/S	657.7	666.9	667.6	668.42	F/S
15	691.7	F/S	680.3	679.9	664.4	654.7	F/S	657.7	666.9	667.6	668.52	F/S
16	691.4	F/S	679.8	678.8	663.7	653.4	F/S	657.9	667.4	667.6	668.73	F/S
17	691.5	F/S	679.8	678.6	662.8	652.8	F/S	657.9	667.6	667.6	668.66	F/S
18	691.5	F/S	679.8	678.3	661.8	652.5	F/S	657.9	667.7	667.5	668.97	F/S
19	690.6	F/S	679.6	F/S	660.8	652.3	F/S	657.6	667.9	667.5	669.21	F/S
20	690.6	F/S	679.5	F/S	660.2	651.9	F/S	657.7	668.1	667.5	669.45	F/S
21	690.4	F/S	679.5	F/S	659.4	651.4	F/S	657.9	668.2	667.5	669.43	F/S
22	690.4	F/S	679.4	F/S	659.4	651.0	F/S	658.2	668.3	667.3	669.43	F/S
23	690.4	F/S	679.2	F/S	657.4	650.6	F/S	659.6	668.3	667.3	669.61	F/S
24	689.9	F/S	679.2	F/S	656.4	650.4	F/S	659.4	668.4	667.3	670.98	F/S
25	689.5	F/S	679.2	F/S	655.1	650.2	F/S	660.2	668.7	667.5	669.78	F/S
26	689.4	F/S	679.2	F/S	654.3	650.6	F/S	661.5	669.1	667.5	669.9	F/S
27	688.7	F/S	679.7	F/S	654.1	651.5	F/S	661.8	669.1	667.4	670.08	F/S
28	688.3	F/S	680.1	F/S	654.3	652.1	F/S	662.3	669.2	B/D	670.61	F/S
29	688.3	F/S	680.3	F/S	654.2	652.3	F/S	662.8	669.4	B/D	670.77	F/S
30	688.0		680.5	F/S	653.9	652.6	F/S	663.3	669.4	B/D	670.77	F/S
31	687.5		680.5		653.4		F/S	664.5		B/D		F/S

Table A-4 City of Hondo index well (TD-69-47-306) daily high water levels (in feet above MSL), 1996.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	715.0	703.8	697.4	699.5	687.6	665.3	661.9	670.6	678.1	683.3	682.1	688.8
2	714.5	702.3	698.0	695.2	681.5	666.8	662.3	670.5	678.6	683.3	682.2	689.0
3	714.4	702.3	697.9	695.0	679.5	670.1	662.0	670.5	678.7	682.9	682.2	689.0
4	714.5	702.3	698.3	694.2	679.5	671.3	662.9	670.6	679.1	683.0	682.6	689.3
5	714.3	702.3	698.3	694.8	677.8	671.0	663.4	670.5	679.4	681.5	682.8	689.6
6	714.1	698.4	698.6	695.9	678.4	670.1	663.6	669.7	679.5	681.8	683.0	689.8
7	714.0	697.8	698.3	696.7	678.3	668.9	664.4	669.2	F/S	681.9	682.9	689.9
8	713.9	696.1	698.4	696.8	677.6	668.4	664.5	668.8	F/S	681.9	684.3	689.7
9	714.0	695.3	698.6	696.3	678.3	668.0	664.8	668.9	F/S	681.9	684.8	689.9
10	714.0	694.0	699.2	695.6	678.5	667.5	668.1	669.4	680.1	681.8	684.7	690.0
11	713.7	692.4	698.9	695.5	680.4	664.5	670.0	669.0	680.1	681.8	684.5	690.1
12	712.8	692.4	699.0	695.6	682.1	662.8	671.3	668.9	680.4	681.4	684.7	689.8
13	712.9	692.1	698.8	695.1	682.5	661.2	672.0	668.8	680.6	680.8	684.8	689.6
14	712.9	690.5	698.8	694.8	680.2	660.7	672.2	668.6	F/S	680.9	685.0	689.8
15	712.9	689.8	698.1	693.9	678.8	659.9	672.2	668.6	F/S	680.9	685.0	689.8
16	712.3	689.3	697.6	693.1	676.8	658.6	672.1	669.0	F/S	680.9	685.4	690.9
17	712.1	689.1	698.0	692.3	674.7	659.0	672.2	668.9	682.2	681.0	685.4	690.5
18	711.5	688.5	698.0	691.5	673.2	659.2	671.4	668.3	682.4	680.5	685.8	690.3
19	711.5	688.7	698.1	690.8	672.4	658.8	671.0	668.3	682.6	680.8	686.0	690.4
20	711.5	687.5	697.8	689.6	671.7	657.7	670.5	668.8	682.9	680.9	686.2	690.4
21	711.2	686.4	697.5	688.3	669.5	656.6	670.3	668.9	682.9	680.8	686.2	690.7
22	711.2	686.3	696.7	688.2	667.7	656.6	670.3	669.2	682.9	680.5	685.7	690.9
23	710.7	F/S	696.6	F/S	666.5	656.9	670.1	670.5	682.8	680.6	686.2	690.9
24	709.3	F/S	697.0	F/S	665.4	656.5	670.1	672.1	683.0	680.6	686.4	690.6
25	709.0	F/S	696.9	F/S	664.2	656.0	669.1	673.3	683.2	680.8	686.9	690.9
26	707.4	F/S	697.8	F/S	664.2	658.8	669.0	674.4	683.0	681.0	687.1	691.2
27	706.7	F/S	698.8	F/S	665.3	661.1	670.0	675.28	683.6	680.8	687.3	691.0
28	706.0	F/S	699.2	F/S	666.0	662.2	670.1	675.77	683.7	680.9	687.9	691.0
29	706.0	F/S	699.4	F/S	665.4	662.3	670.4	676.27	683.9	681.3	688.5	691.0
30	705.9		699.5	F/S	663.9	662.6	670.5	676.69	683.8	681.5	688.7	691.1
31	704.9		699.4		663.2		670.7	677.49		681.9		690.8

"F/S" indicates mechanical failure.
"N/D" indicates no data available.
"OOC" indicates station out of commission.

Table A-5 J-17, Bexar County index well (AY-68-37-203) daily high water levels (in feet above MSL), 1996.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	664.9	659.8	652.9	653.2	645.7	634.9	630.7	632.8	640.1	645.3	643.8	648.7
2	664.8	659.8	653.7	652.9	645.1	635.8	631.0	633.4	640.7	644.9	643.9	648.7
3	664.1	659.5	653.9	652.8	644.0	636.4	630.5	632.6	640.4	644.3	643.6	648.7
4	664.2	659.3	653.7	652.5	644.0	636.7	630.6	632.1	640.3	644.5	643.4	648.4
5	664.0	659.2	653.9	653.2	643.1	636.6	631.0	630.2	640.6	644.8	643.8	648.9
6	663.9	659.0	654.1	654.0	642.0	636.0	630.4	630.4	640.8	645.1	643.3	649.2
7	663.7	658.4	653.7	654.5	642.3	633.7	628.6	630.9	641.0	644.7	643.6	649.2
8	663.3	657.9	653.7	654.6	642.0	635.8	628.8	631.1	640.6	644.8	644.3	649.1
9	663.5	657.2	653.9	653.6	642.8	636.1	630.0	631.7	641.2	644.3	644.3	649.2
10	663.3	656.9	654.4	652.7	642.2	635.7	630.1	631.3	642.2	644.0	644.0	649.2
11	663.2	656.4	654.1	652.0	643.0	634.5	631.4	629.4	641.9	644.1	644.2	648.9
12	663.1	655.6	654.0	652.2	643.9	632.3	632.7	629.6	641.5	643.8	643.9	648.9
13	663.2	655.1	654.0	651.7	643.5	631.5	632.2	630.9	641.7	643.3	643.5	648.9
14	663.2	654.9	653.5	651.3	642.9	631.7	630.8	630.8	642.5	643.1	643.6	648.9
15	663.2	654.3	653.0	650.2	642.1	631.3	631.2	631.2	643.0	643.4	644.2	649.2
16	662.5	653.5	652.9	650.0	641.4	629.9	632.2	631.6	643.6	643.2	644.8	650.0
17	662.5	653.7	653.0	649.7	639.7	629.6	631.5	631.1	643.7	643.0	644.8	650.6
18	662.4	653.7	652.6	649.0	639.5	630.0	631.6	629.2	643.0	642.9	645.3	649.9
19	661.6	652.8	652.8	648.1	638.5	629.6	632.0	628.9	643.1	643.3	645.3	649.5
20	662.2	651.9	652.6	648.0	637.4	628.8	631.5	631.1	643.3	642.9	645.3	649.3
21	662.0	651.2	652.5	647.8	637.6	628.6	629.7	630.5	643.8	642.6	645.2	650.0
22	661.7	650.6	652.1	647.3	637.0	628.1	629.7	631.9	643.7	642.9	645.5	650.2
23	661.9	649.9	652.2	648.1	636.1	627.5	630.7	633.2	643.3	642.7	645.9	650.3
24	661.2	649.9	652.5	647.6	633.4	627.6	630.3	633.9	643.4	642.9	646.2	650.2
25	661.0	650.0	651.9	647.3	633.7	629.0	630.7	634.9	645.2	643.7	646.9	650.4
26	660.9	649.6	652.1	645.8	634.6	630.1	632.6	635.9	646.1	643.7	646.6	651.1
27	660.6	650.0	653.0	645.8	635.0	631.2	633.2	636.7	646.1	643.2	646.4	650.7
28	660.6	650.1	654.0	645.1	635.8	631.7	632.6	637.0	645.9	643.4	647.3	650.9
29	660.7	650.8	653.8	644.4	635.4	631.6	632.7	637.2	645.8	643.9	648.4	650.6
30	659.9		654.2	645.9	634.3	630.7	633.1	638.0	645.6	643.4	648.8	650.5
31	659.6		653.9		634.4		632.6	639.0		643.4		650.4

Table A-6 City of Uvalde index well (YP-69-50-302) daily high water levels (in feet above MSL), 1996.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	874.2	873.0	871.0	870.8	868.6	863.8	859.6	859.4	859.6	861.6	863.4	866.0
2	874.1	872.9	871.0	870.8	868.4	863.7	859.5	859.3	859.6	861.7	863.5	866.1
3	874.1	872.8	871.0	870.7	868.3	863.6	859.2	859.3	859.6	861.8	863.6	866.1
4	874.1	872.7	871.0	870.7	868.2	863.5	859.2	859.3	859.6	861.7	863.7	866.3
5	874.1	872.7	871.0	870.7	868.1	863.4	859.2	859.3	859.7	861.9	863.7	866.4
6	874.1	873.1	871.0	870.7	868.0	863.2	859.1	859.2	859.7	861.9	863.8	866.5
7	874.1	873.0	871.0	870.7	867.9	863.1	859.1	859.2	859.7	862.0	863.9	866.5
8	874.1	872.9	871.0	870.8	867.8	862.9	859.1	859.2	859.8	862.0	864.0	866.6
9	874.1	872.8	871.0	870.8	867.7	862.7	859.0	859.2	859.9	862.1	864.0	866.7
10	874.1	872.7	871.0	870.7	867.6	862.6	859.2	859.2	859.9	862.1	864.1	866.8
11	874.1	872.6	871.0	870.7	867.4	861.6	859.1	859.2	860.0	862.2	864.2	866.8
12	874.0	872.5	871.0	870.6	867.3	861.6	859.6	859.2	860.0	862.2	864.2	866.9
13	874.0	872.4	871.0	870.6	867.2	861.4	859.7	859.2	860.1	862.3	864.3	867.0
14	874.0	872.4	870.9	870.5	867.1	861.3	859.7	859.3	860.1	862.3	864.4	867.1
15	874.0	872.4	870.9	870.5	866.9	861.3	859.8	859.3	860.1	862.3	864.4	867.1
16	874.0	872.1	870.9	870.4	866.7	861.0	859.8	859.4	860.4	862.5	864.6	867.2
17	874.0	872.0	870.9	870.3	866.5	860.8	859.8	859.3	860.5	862.5	864.7	867.3
18	874.0	871.9	870.9	870.2	866.3	860.7	859.8	859.3	860.5	862.5	864.8	867.3
19	874.0	871.8	870.9	870.1	866.2	860.5	859.8	859.2	860.6	862.6	864.9	867.4
20	874.0	871.6	870.8	869.9	866.0	860.3	859.8	859.2	860.7	862.7	865.0	867.5
21	873.9	871.5	870.8	869.8	865.8	860.1	859.8	859.3	860.8	862.7	865.1	867.6
22	873.9	871.4	870.8	869.7	865.6	860.4	859.7	859.3	860.9	862.7	865.1	867.7
23	873.9	871.2	870.7	869.6	865.4	860.3	859.7	859.3	861.0	862.8	865.2	867.7
24	873.8	871.1	870.7	869.5	865.2	860.1	859.6	859.4	861.0	862.8	865.3	867.7
25	873.7	871.0	870.7	869.3	865.0	860.0	859.6	859.4	861.2	862.9	865.4	867.9
26	873.6	871.0	870.7	869.2	864.8	859.9	859.6	859.4	861.3	862.9	865.5	867.9
27	873.5	871.0	870.8	869.0	864.6	859.9	859.6	859.5	861.3	863.0	865.6	868.0
28	873.4	871.0	870.8	868.9	864.5	859.8	859.6	859.5	861.4	863.1	865.7	868.0
29	873.3	870.9	870.9	868.8	864.3	859.7	859.6	859.5	861.5	863.2	865.9	868.1
30	873.2		870.9	868.7	864.1	859.6	859.5	859.6	861.6	863.3	865.9	868.1
31	873.1		870.9		864.0		859.5	859.6		863.3		868.18

APPENDIX B – Water-Quality Data

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Bexar County

State well number	Date sampled	Time sampled	Depth of well (ft)	Pump or flow period prior to sampling (min)	Flow rate (gpm)	Water temperature °C	Specific conductance µS/cm	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved solids (mg/L)
AY-68-37-521	19960126	11:16	1,275	93	12.0	32.0	5,500	6.7	232	2,240	542	208	571	36.4	900	1,692	4.50	9.4	4,688
	19960218	11:39	1,275	91	12.0	31.0	5,450	6.9	220	2,220	513	204	472	35.7	880	1,244	6.25	9.0	4,352
	19960326	10:57	1,275	142	12.0	31.0	5,460	6.8	233	2,220	548	212	360	33.2	890	1,620	3.25	9.0	4,408
	19960425	11:30	1,275	102	11.0	30.5	5,390	6.7	240	2,200	535	209	394	32.1	850	1,505	4.25	8.8	4,428
	19960531	12:35	1,275	155	8.0	31.0	5,430	6.5	244	2,180	535	213	301	30.9	870	1,790	4.90	9.6	4,784
	19960628	19:40	1,275	190	12.0	31.0	5,350	6.7	248	2,300	558	205	444	29.5	900	1,915	2.75	8.7	4,592
	19960731	18:00	1,275	250	12.0	31.5	5,340	6.8	216	2,140	598	212	494	30.7	1,200	1,998	4.75	8.3	4,368
	19960828	13:17	1,275	157	12.0	30.5	5,380	6.7	200	2,100	554	214	489	31.1	870	1,882	4.50	9.2	4,540
	19960925	13:35	1,275	175	12.0	31.0	5,380	6.7	248	2,200	555	202	499	26.1	880	1,970	5.00	7.7	4,516
	19961025	14:11	1,275	249	12.0	31.5	5,490	6.7	239	2,450	532	193	668	31.1	930	1,918	4.00	8.9	4,540
	19961125	14:49	1,275	229	12.0	31.0	5,470	6.6	235	2,300	547	202	494	26.9	920	1,928	4.75	7.8	4,530
	19961230	14:15	1,275	313	12.0	31.5	5,460	6.7	244	2,250	556	203	464	29.4	900	1,960	4.75	8.9	4,408
AY-68-37-522	19960126	11:21	1,075	100	12.0	31.0	4,100	6.8	220	1,640	394	149	475	26.9	650	1,313	3.50	7.4	3,400
	19960218	11:42	1,075	90	12.0	30.1	4,120	7.0	210	1,700	398	147	352	29.4	660	950	5.25	7.6	3,056
	19960326	11:03	1,075	143	12.0	30.3	4,110	6.9	210	1,580	404	151	297	27.2	630	834	2.50	7.8	3,304
	19960425	11:34	1,075	108	11.0	30.6	4,140	6.9	230	1,600	400	150	293	26.0	630	1,133	4.00	7.9	3,248
	19960531	11:15	1,075	75	9.7	29.0	4,160	6.8	228	1,580	402	154	225	24.8	640	1,328	4.10	8.5	3,532
	19960628	17:08	1,075	63	12.0	30.5	4,080	6.9	222	1,550	396	151	351	22.8	640	1,388	3.75	8.3	3,384
	19960731	13:40	1,075	115	11.1	30.5	4,060	6.9	224	1,560	417	155	314	25.3	660	1,312	5.00	8.0	3,240
	19960827	13:55	1,075	175	12.0	30.0	4,090	6.8	182	1,550	412	147	348	36.3	660	1,398	4.00	9.0	3,350
	19960925	12:45	1,075	125	12.0	30.0	4,110	6.7	222	1,550	416	150	368	20.6	670	1,424	4.00	7.2	3,296
	19961025	13:38	1,075	218	12.0	30.0	4,130	6.7	222	1,600	388	140	254	25.7	660	1,422	3.75	8.0	3,248
	19961125	13:56	1,075	176	12.0	30.0	4,110	6.8	217	1,700	414	147	311	23.0	660	1,445	3.00	7.9	3,224
	19961230	13:45	1,075	265	12.0	31.0	4,110	6.8	218	1,650	400	146	339	23.2	650	1,439	4.00	1.0	3,284
AY-68-37-523	19960126	11:24	1,175	101	12.0	31.0	5,700	6.7	240	2,260	541	215	755	38.2	910	1,682	4.25	8.5	4,688
	19960218	11:45	1,175	95	12.0	30.0	5,650	6.9	220	2,260	568	230	595	38.2	940	1,649	5.75	8.8	4,436
	19960326	11:00	1,175	145	12.0	30.0	5,640	6.8	240	2,320	532	217	488	34.2	920	1,410	5.25	8.4	4,616
	19960425	11:27	1,175	102	11.0	30.0	5,690	6.7	250	2,200	542	218	437	33.2	920	1,491	4.50	8.5	4,536
	19960531	13:05	1,175	185	4.8	30.0	5,690	6.5	248	2,220	537	222	448	25.1	1,100	1,710	5.50	7.2	4,956
	19960628	18:45	1,175	135	12.0	30.5	5,600	6.7	244	2,350	537	221	471	26.3	950	1,973	5.25	8.7	4,708
	19960731	14:55	1,175	185	10.4	31.0	5,560	6.7	218	2,120	583	217	496	32.4	1,250	1,940	6.15	8.8	4,564
	19960827	15:35	1,175	275	12.0	30.0	5,600	6.7	201	2,050	553	232	573	33.1	940	1,872	4.50	7.9	4,880
	19960925	14:17	1,175	216	12.0	30.5	5,560	6.7	248	2,200	544	212	541	27.7	960	1,990	4.75	8.0	4,656
	19961025	14:36	1,175	275	12.0	30.0	5,710	6.7	244	2,250	521	205	470	32.1	970	2,004	4.25	8.3	4,726
	19961125	15:10	1,175	250	12.0	30.0	5,660	6.7	238	2,350	541	213	510	29.9	960	1,883	4.5	8.3	4,548
	19961230	14:42	1,175	342	12.0	30.5	5,630	6.7	242	2,350	570	222	497	30.6	940	2,029	8.4	8.4	4,568
AY-68-37-524	19960126	10:30	881	84	14.0	28.5	908	7.4	200	370	91	31	78.4	5.8	78	161	1.33	3.8	600
	19960218	10:52	881	55	14.0	28.0	914	7.4	200	360	94	33	53.2	5.7	80	121	1.49	5.8	504
	19960326	09:50	881	93	14.0	27.5	913	7.1	192	380	92	33	42.7	4.8	76	136	1.24	6.4	548
	19960425	10:40	881	66	11.0	28.5	918	7.4	200	360	92	33	42.9	4.5	78	131	1.31	6.5	588
	19960529	14:40	881	190	12.0	28.5	926	7.0	202	380	91	32	53.1	3.9	80	183	1.48	6.4	592
	19960628	14:55	881	425	6.8	28.0	918	7.2	196	372	95	34	50.4	5.3	80	178	1.37	6.6	652
	19960724	15:45	881	185	5.4	27.5	914	7.3	187	350	100	34	54.3	3.8	100	157	1.42	6.3	584
	19960823	15:25	881	265	12.0	28.5	915	7.2	182	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	19960925	14:50	881	275	12.0	29.0	917	7.2	202	340	94	32	62.5	7.2	95	180	1.36	6.6	616
	19961025	15:23	881	303	12.0	28.5	932	7.1	238	370	87	31	41.8	3.9	105	167	1.44	6.6	600
	19961125	16:41	881	331	12.0	27.5	922	7.2	199	370	91	33	45.2	3.4	105	172	1.68	6.3	592
	19961230	15:29	881	374	12.0	28.5	923	7.2	202	370	96	33	51	4	95	167	1.59	6.4	632
AY-68-37-525	19960126	10:33	1,150	65	12.0	28.5	6,350	6.8	238	2,520	563	253	772	42.9	1,350	1,675	4.75	4.9	5,248
	19960216	10:57	1,150	59	12.0	27.5	6,290	6.9	240	2,540	576	261	580	41.1	1,350	1,458	7.00	8.6	5,056
	19960326	09:52	1,150	90	12.0	28.0	6,310	6.8	248	2,600	573	260	488	37.6	1,350	1,681	3.50	8.7	4,996
	19960425	10:43	1,150	68	11.0	27.5	6,340	6.9	245	2,500	573	265	498	36.0	1,300	1,775	4.75	8.4	5,174
	19960529	15:10	1,150	220	3.0	28.0	6,310	6.7	260	2,520	552	250	541	35.1	1,140	2,059	2.75	8.5	5,264
	19960626	15:25	1,150	95	12.0	29.5	6,160	6.6	243	2,350	559	267	586	30.2	1,450	1,124	4.75	8.6	5,320
	19960726	14:55	1,150	115	11.0	29.0	6,190	6.7	252	2,400	616	259	554	35.6	1,400	1,888	5.75	8.9	5,280

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Bexar County

State well number	Date sampled	Time sampled	Depth of well (ft)	Pump or flow period prior to sampling (min)	Flow rate (gpm)	Water temperature °C	Specific conductance µS/cm	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved solids (mg/L)
	19960827	16:40	1,150	320	12.0	28.0	6,290	6.8	262	2,450	595	262	586	36.6	1,300	2,152	5.00	6.2	5,300
	19960925	15:43	1,150	333	12.0	29.0	6,340	6.7	264	2,500	622	267	601	33.3	1,400	2,260	5.25	6.1	5,340
	19961025	15:52	1,150	332	12.0	26.5	6,340	6.7	264	2,550	570	245	542	35.1	1,400	2,276	4.75	6.4	5,348
	19961125	17:11	1,150	361	12.0	27.0	6,420	6.7	257	2,650	600	263	593	33.7	1,350	2,270	5.75	6.4	5,264
	19961230	15:55	1,150	400	12.0	29.0	6,360	6.7	260	2,600	602	263	567	34.7	1,400	2,130	5.40	6.2	5,218
AY-68-37-526	19960126	12:00	1,223	161	13.0	26.5	840	7.3	190	350	87	30	58.5	3.8	74	122	0.65	5.3	532
	19960216	12:30	1,223	159	13.0	26.0	843	7.4	200	350	93	30	41.2	3.4	74	95	0.65	5.3	574
	19960326	14:25	1,223	170	13.0	25.5	805	7.4	200	350	84	31	31.7	2.4	70	105	0.55	5.1	508
	19960425	12:24	1,223	174	10.0	25.0	888	7.6	200	360	56	24	19	1.2	40	46	0.47	4.6	340
	19960529	13:35	1,223	149	12.0	28.0	901	7.3	203	370	83	32	39	2.2	80	156	0.68	5.5	560
	19960625	14:30	1,223	225	12.5	26.5	909	7.2	195	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	19960726	12:28	1,223	210	11.1	27.0	880	7.4	179	340	83	32	38.4	2	80	139	0.68	5.6	512
	19960823	14:16	1,223	216	12.0	27.0	844	7.3	188	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	19960927	15:10	1,223	355	12.0	25.5	802	7.3	203	320	66	30	35.6	3.5	70	139	0.69	3.9	504
	19961029	15:25	1,223	250	12.0	27.0	824	7.2	204	336	87	30	30.6	2.1	74	140	0.72	5.6	554
	19961127	13:56	1,223	206	12.0	25.0	802	7.4	202	328	86	28	34.5	1.6	72	123	0.67	5.7	496
	19961230	17:19	1,223	469	12.0	25.5	790	7.3	208	312	84	27	30.3	1.9	62	111	0.62	5.3	476
AY-68-37-527	19960126	12:05	926	158	25.0	27.0	530	7.3	200	232	66	18	17.4	1.8	34	31	0.31	5.2	300
	19960216	12:25	926	156	25.0	26.5	540	7.2	220	252	68	19	15.7	1.3	36	31	0.40	5.6	276
	19960326	14:15	926	160	25.0	25.5	530	7.3	200	244	64	18	11.4	<1.0	36	27	0.49	5.5	296
	19960425	12:20	926	270	25.0	27.0	530	7.2	200	240	60	19	12.4	<1.0	34	30	0.37	5.5	300
	19960531	14:15	926	285	12.0	26.5	525	7.1	199	228	65	19	9.8	<1.0	36	32	0.26	5.6	308
	19960626	16:50	926	275	12.0	26.5	521	7.4	196	242	66	19	16.0	2.6	31	31	0.30	5.4	312
	19960724	16:35	926	455	12.0	28.0	490	7.4	200	224	66	18	12.8	<1.0	30	28	0.27	5.7	296
	19960822	16:50	926	330	12.0	26.0	527	7.3	200	230	65	17	13.0	1.4	26	33	0.40	12	288
	19960927	14:46	926	330	12.0	27.0	510	7.3	204	220	65	19	13.1	<1.0	29	34	0.30	5.6	296
	19961031	16:21	926	331	25.0	27.5	527	7.3	204	240	66	18	12.6	<1.0	34	36	0.30	5.6	308
	19961125	16:01	926	266	25.0	27.0	526	7.4	200	240	65	19	13.0	<1.0	30	33	0.32	5.6	304
	19961230	16:51	926	441	25.0	26.5	520	7.4	204	232	67	18	12.3	<1.0	28	33	0.26	5.4	304
AY-68-37-604	19960530	11:15	NA	265	NA	27.0	500	7.5	198	228	64	17	9.6	<1	34	20	0.29	4.3	288
AY-68-37-608	19960530	10:30	NA	35	NA	27.0	490	7.5	198	228	62	17	8.7	<1	34	21	0.3	6.3	284
AY-68-37-705	19960530	09:15	NA	35	NA	27.0	490	7.5	200	226	62	17	9.2	<1	32	20	0.3	5.8	280
AY-68-38-107	19960530	12:15	NA	45	NA	27.5	510	7.5	200	236	63	18	11.4	<1	36	29	0.35	3.7	288
AY-68-30-801	19960620	15:18	700	23	900	28.0	536	7.0	190	240	64	19	13.6	1.4	33	34	0.41	5.8	348
AY-68-29-109	19960709	14:22	460	>1440	250.0	23.5	604	6.7	267	292	94	16	6.1	<1	32	10	0.12	5.9	304
AY-68-29-401	19960709	13:55	517	20	650.0	24.5	560	6.9	265	280	81	19	5.1	<1	28	10	0.14	5.4	292
AY-68-28-203	19960723	09:30	435	>180	240	23.5	508	7	238	245	80	11	9	<1	18	9	0.18	5.7	292
AY-68-28-501	19960723	10:00	469	>180	125	23.5	563	6.9	251	256	98	5	9.5	<1	25	7	0.09	5.4	340
AY-68-28-404	19960329	13:43	NA	>1440	NA	22.5	600	6.9	274	284	91	16	10.6	<1	26	19	0.19	4.9	340
AY-68-28-702	19960905	10:25	450	30	1150	22.0	573	7.1	250	260	84	17	10.5	<1	26	23	0.3	5.4	360
AY-68-29-405	19960905	07:25	NA	240	NA	23.0	673	6.9	299	330	116	10	11.1	<1	28	14	0.14	6.5	428
AY-68-35-203	19960905	14:30	540	>1440	NA	24.0	496	7.1	201	228	68	16	10	<1	26	29	0.24	5.7	328
AY-68-28-508	19960906	09:20	484	>1440	NA	23.0	536	7.2	229	240	84	12	9.9	<1	28	22	0.22	5.8	336
AY-68-29-303	19960918	09:55	527	>1440	400.0	22.0	468	7.1	203	208	76	8	8	<1	16	20	0.14	4.9	304

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Comal County

State Well ID Number	Date	Time	Depth of Well, Total Feet	Pump or Flow Period Prior to Smpling (min)	Flow Rate, Inst (gpm)	Water Temp °C	Specific Conductance µS/cm	pH stdrd units	Alkalinity, Fix End Field, $CaCO_3$ mg/L	Hardness Total mg/L as $CaCO_3$	Calcium, dissolved mg/L as $CaCO_3$	Magnesium, dissolved mg/L as Mg	Sodium, dissolved mg/L as Na	Potassium, dissolved mg/L as K	Chloride, dissolved mg/L as Cl	Sulfate, dissolved mg/L as SO_4	Fluoride, dissolved mg/L as F	Silica, dissolved mg/L as SiO_2	Total dissolved solids mg/L
DX-68-16-502	19960925	14:53	280	23	250	23.0	580	7.0	265	264	87	17	10.2	<1	28	23	0.21	6.2	356
DX-68-22-901	19960926	10:57	255	20	1650	22.5	506	6.9	237	232	79	12	8.5	<1	16	10	0.16	5.3	260
DX-68-22-902	19960926	11:27	240	17	650	22.0	524	6.9	245	244	84	12	8.9	<1	16	11	0.17	5.2	264
DX-68-23-301	19960528	13:55	23.5	535		23.5	535	7.4	230	258	71	16	9.9	<1	28	22	0.22	5.7	300
DX-68-23-303	19960529	15:05	1045	29	4200	25.0	551	7.0	232	272	76	18	10.4	<1	28	32	0.30	4.9	268
DX-68-23-305	19960924	14:53	110	23	2750	24.5	550	7.1	233	252	75	16	11.7	<1	23	29	0.25	6.2	348
DX-68-23-602	19960924	14:12	790	27	2750	23.0	520	7.1	234	238	77	14	10.3	<1	19	21	0.21	5.8	320
DX-68-23-618A	19960110	13:09	576	49	13	25.0	2,730	7.2	270	830	152	103	383	28.0	530	460	3.4	6.4	2,000
	19960214	12:52	576	48	13	25.5	2,950	6.9	260	840	156	103	327	26.3	530	481	3.5	6.1	1,992
	19960329	12:35	576	65	13	25.0	2,910	6.9	270	840	156	104	257	24.3	490	460	3.7	6.2	1,980
	19960412	14:00	576	65	13	25.5	2,940	7.0	240	830	155	103	260	23.6	500	508	3.6	6.5	1,888
	19960529	13:55	576	50	13	25.5	3,040	6.9	250	850	156	106	270	23.8	525	542	3.5	5.2	1,992
	19960624	14:40	576	48	13	25.5	3,030	6.9	260	1100	160	106	347	23.0	560	590	3.6	6.7	2,124
	19960722	12:27	576	43	13	25.5	2,930	6.9	270	800	152	105	308	23.5	560	568	4.2	6.6	1,972
	19960821	12:38	576	42	13	26.0	2,940	7.0	276	775	162	104	289	23.2	550	590	3.5	7.4	1,964
	19960918	11:23	576	48	13	25.5	2,870	7.0	280	800	158	99	252	22.9	550	561	3.2	7.1	1,956
	19961016	12:48	576	68	13	25.5	2,910	7.0	276	780	153	99	290	23.8	530	591	3.5	6.9	1,892
	19961121	13:48	576	53	13	25.5	2,880	7.0	268	810	155	101	297	23.8	550	585	3.6	6.9	1,956
	19961219	13:12	576	57	13	25.0	2,880	6.9	249	810	155	102	292	20.3	540	508	3.4	6.9	1,920
DX-68-23-618B	19960110	13:15	736	55	13	26.0	1,700	7.2	220	540	97	65	183	16.4	275	249	3.4	6.2	1,176
	19960214	12:55	736	49	13	26.0	1,720	7.1	230	532	96	63	156	14.3	265	231	3.4	6.3	1,144
	19960329	12:40	736	70	13	26.0	1,730	7.1	230	540	98	64	126	13.4	265	276	3.7	6.1	1,140
	19960412	14:07	736	72	13	26.5	1,740	7.1	230	532	98	66	129	12.6	265	246	3.6	6.2	1,192
	19960529	14:00	736	55	13	26.5	1,700	7.1	220	546	93	63	127	12.2	265	270	3.2	3.9	1,040
	19960624	14:41	736	48	13	26.0	1,720	7.1	212	545	98	63	175	12.2	270	287	3.4	6.3	1,200
	19960722	12:28	736	43	13	26.5	1,732	7.1	230	520	96	66	141	13.2	310	304	3.5	6.4	1,136
	19960821	12:39	736	43	13	26.0	1,736	7.2	232	510	99	63	126	12.1	300	288	3.7	6.0	1,092
	19960918	11:25	736	50	13	26.0	1,743	7.1	234	520	97	64	132	11.9	310	312	3.5	6.7	1,196
	19961016	12:54	736	74	13	26.5	1,740	7.1	236	510	104	63	145	13.0	300	311	3.5	6.5	1,096
	19961121	13:54	736	59	13	26.5	1,738	7.1	230	530	96	64	139	13.0	310	310	3.5	6.6	1,192
	11961219	13:16	736	61	13	26.0	1,741	6.9	206	530	98	65	131	10.3	290	282	3.6	6.7	1,136
DX-68-23-617	19960110	11:23	916.5	53	12	26.0	560	7.3	220	272	55	27	11.0	1.9	22	42	1.16	5.9	360
	19960214	10:20	916.5	50	11	26.0	566	7.2	210	272	58	26	12.3	2.5	21	40	1.20	5.8	360
	19960327	11:24	916.5	54	11	26.0	563	7.0	220	268	58	26	10.0	1.4	21	45	1.50	5.8	316
	19960412	11:55	916.5	65	11	26.0	563	7.2	200	268	58	26	10.5	<1.0	26	48	1.30	6.0	396
	19960529	10:40	916.5	55	11	26.5	563	7.3	200	268	56	26	10.4	<1.0	26	54	1.36	5.8	330
	19960624	10:20	916.5	45	12	26.5	566	7.3	209	266	59	27	13.9	1.4	22	55	1.30	5.8	380
	19960722	11:10	916.5	44	11	26.5	565	7.3	219	262	56	29	10.4	3.0	23	52	1.44	5.9	384
	19960821	11:33	916.5	43	11	26.5	568	7.3	222	264	59	27	11.4	1.4	22	53	1.30	6.2	340
	19960918	08:38	916.5	38	11	26.0	562	7.2	223	252	56	27	10.4	1.1	22	55	1.34	5.3	400
	19961016	11:25	916.5	70	11	26.5	564	7.3	224	248	56	27	11.4	<1.0	22	57	1.22	6.0	324
	19961121	09:27	916.5	57	11	26.0	560	7.1	214	274	52	27	12.3	1.9	21	58	1.28	6.3	396
	19961219	09:35	916.5	65	11	26.0	566	7.1	220	268	59	28	10.6	<1.0	21	58	1.27	6.4	280
DX-68-23-618	19960110	11:30	660.1	60	12	25.0	620	7.2	200	284	50	33	25.4	2.9	43	54	2.55	6.2	416
	19960214	10:28	660.1	58	12	25.0	626	7.3	200	268	51	33	25.7	3.1	42	49	2.70	6.1	388
	19960327	11:27	660.1	57	12	25.5	628	7.4	200	264	53	34	21.3	2.5	41	56	3.05	6.1	344
	19960412	12:05	660.1	95	12	25.5	618	7.4	200	256	52	34	21.8	2.1	48	56	2.55	6.3	372
	19960529	10:55	660.1	70	12	26.0	622	7.4	180	260	50	33	21.2	1.8	50	60	2.15	5.9	316
	19960624	10:40	660.1	50	12	25.5	623	7.3	198	264	51	33	28.7	2.0	43	63	2.90	6.0	406
	19960722	11:09	660.1	47	12	26.0	626	7.2	194	254	51	35	22.2	3.0	52	64	3.03	6.3	368
	19960821	11:38	660.1	48	12	26.0	621	7.4	200	248	53	34	22.3	2.2	50	63	2.65	5.8	344
	19960918	08:42	660.1	42	12	25.5	617	7.4	203	244	50	31	21.0	1.8	52	63	2.95	5.8	408
	19961016	11:15	660.1	60	12	25.5	628	7.4	208	252	50	32	25.2	1.9	48	65	2.50	6.4	356
	19961121	10:29	660.1	62	12	25.5	627	7.3	202	260	50	33	24.4	2.4	50	65	2.60	6.7	368
	19961219	10:32	660.1	53	12	25.5	627	7.0	206	260	53	34	25.6	1.7	48	62	2.50	6.8	330
DX-68-23-619A	19960110	10:04	652	54	12	25.0	540	7.2	200	252	48	30	12.8	1.6	28	36	2.40	6.4	352
	19960214	11:40	652	45	13	26.0	540	7.4	200	248	49	30	14.6	2.0	26	32	2.30	6.2	316
	19960327	10:12	652	52	12	25.0	537	7.3	200	252	50	32	12.5	<1.0	27	39	2.30	6.2	280
	19960412	10:07	652	62	12	25.0	530	7.3	210	244	50	31	13.0	1.1	30	39	2.40	6.2	354
	19960529	12:35	652	55	12	26.0	533	7.3	190	240	47	31	10.4	<1.0	32	44	2.25	5.9	288
	19960624	11:48	652	48	12	26.0	542	7.3	198	244	49	31	17.6	1.4	27	48	2.55	6.1	336
	19960722	10:08	652	43	12	26.0	540	7.2	198	236	50	32	12.8	2.0	28	42	1.02	4.3	332
	19960821	10:29	652	42	12	26.0	541	7.4	202	232	52	31	13.4	<1.0	27	45	2.40	4.9	288
	19960918	09:57	652	53	12	26.0	542	7.3	204	236	49	29	12.2	<1.0	27	46	2.95	6.5	336
	19961016	09:56	652	51	12	25.5	541	7.5	196	234	48	30	15.0	<1.0	27	46	2.35	6.4	304
	19961121	11:50	652	56	12	25.5	542	7.3	210	242	50	30	14.0	1.3	28	47	2.40	6.5	328

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Comal County

State Well ID Number	Date	Time	Depth of Well, Total Feet	Pump or Flow Period Prior to Smplng (min)	Flow Rate, Inst (gpm)	Water Temp °C	Specific Conductance µS/cm	pH stdrd units	Alkalinity, Fix End Field, $CaCO_3$ mg/L	Hardness Total mg/L as $CaCO_3$	Calcium, dissolved mg/L as $CaCO_3$	Magnesium, dissolved mg/L as Mg	Sodium, dissolved mg/L as Na	Potassium, dissolved mg/L as K	Chloride, dissolved mg/L as Cl	Sulfate, dissolved mg/L as SO_4	Fluoride, dissolved mg/L as F	Silica, dissolved mg/L as SiO_2	Total dissolved solids mg/L
	19961219	11:50	852	55	12	25.5	542	7.2	207	248	49	31	14.5	<1.0	26	42	2.50	8.6	276
DX-68-23-619B	19960110	10:10	787	60	13	26.0	560	7.1	220	268	57	27	12.2	1.1	24	40	1.49	5.9	360
	19960214	11:45	787	50	13	26.5	562	7.3	220	268	59	26	12.4	1.8	22	36	1.46	5.8	336
	19960327	10:15	787	55	13	25.5	557	7.0	220	264	58	26	10.4	<1.0	22	43	1.60	5.6	320
	19960412	10:12	787	67	13	26.0	559	7.3	220	264	61	27	11.0	<1.0	26	47	1.51	5.9	336
	19960529	12:40	787	60	13	26.5	560	7.3	220	264	57	26	10.3	<1.0	22	46	1.40	4.0	276
	19960624	12:08	787	68	13	26.5	561	7.3	212	264	57	26	14.0	<1.0	23	51	1.46	5.6	328
	19960722	10:09	787	44	11	26.5	560	7.3	215	256	57	26	10.9	1.8	23	45	0.72	4.9	348
	19960821	10:28	787	43	13	26.5	560	7.4	220	256	60	27	11.5	<1.0	24	50	1.62	6.3	326
	19960918	09:57	787	55	13	26.5	562	7.3	222	248	57	26	8.1	<1.0	30	46	1.50	4.7	388
	19961016	10:00	787	55	13	26.0	562	7.3	226	252	57	26	12.3	<1.0	30	53	1.52	6.1	300
	19961121	11:58	787	64	13	26.0	563	7.4	216	268	59	26	11.9	1.0	23	50	1.48	6.0	356
	19961219	11:56	787	61	13	26.0	563	7.0	222	266	59	26	11.2	<1.0	22	49	1.54	5.4	304

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Hays County

State well Number	Date sampled	Time sampled	Depth of Well, (ft)	Pump or Flow Period Prior to Smpling (min)	Flow Rate, (gpm)	Water temperature (°C)	Specific conductance (µS/cm)	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as $CaCO_3$)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO_4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved Solids, Sum (mg/L)
LR-58-58-403	19960904	09:58	250	17	350	22.5	595	7.11	258	280	73	26	9.4	<1	24	27	0.51	5.2	416
LR-67-01-308	19960904	11:02	650	22	400	25.0	702	7.21	219.2	340	60	40	11.5	<1	24	132	3.55	6.1	504
LR-67-01-801	19960528	12:55		>1440		22.0	590	7.30	214	282	79	19	10.4	<1	32	24	0.42	5.1	328
LR-67-01-802	19960904	13:58		>1440		23.0	614	7.02	260	280	89	17	12.2	<1	32	25	0.26	5.8	400
LR-67-01-806	19960904	13:28		>1440		23.0	624	6.94	252.8	300	90	17	12.7	<1	34	29	0.32	5.6	384
LR-67-01-812	19960328	13:28	543	48	13	24.5	14,790	6.29	370	4,100	860	459	1610	89.8	3,700	2,600	5.00	7	11,744
	19960627	14:40	543	45	13	25.0	14,840	6.68	388	4,000	869	476	1980	96.0	4,150	2,786	5.75	7.2	11,988
	19960930	14:25	543	67	13	24.5	14,790	6.49	384	3,800	868	449	1730	91.8	4,200	2,980	5.10	6.9	11,784
LR-67-01-813A	19960328	12:05	564	55	13	24.5	14,750	6.41	380	4,200	871	467	1590	85.2	3,950	2,630	6.00	6.7	11,764
	19960627	12:28	564	53	11	24.5	14,860	6.48	400	4,200	880	468	1960	96.0	3,700	2,833	6.00	7.2	12,023
	19961001	11:20	564	65	11	24.5	14,820	6.31	376	4,000	859	451	1824	76.2	4,000	2,970	4.70	6.3	11,576
LR-67-01-813B	19960328	12:08	699	58	13	25.5	14,770	6.38	370	4,100	861	461	1600	90.3	4,050	2,566	5.30	6.7	11,700
	19960627	12:30	699	55	13	25.5	14,750	6.42	368	3,700	884	460	2040	98.0	3,800	2,854	5.75	7.2	11,812
	19961001	12:33	699	61	13	25.5	14,780	6.28	380	3,700	876	460	1980	73.6	3,950	2,850	5.08	7.2	11,668
LR-67-01-814A	19960328	10:38	556	38	13	25.0	14,820	6.33	380	4,100	849	460	1580	89.8	4,050	2,460	5.00	6.9	11,980
	19960627	10:58	556	53	13	25.0	14,530	6.43	380	4,200	873	475	1910	103.0	4,050	2,834	5.75	7.5	12,184
	19960930	10:55	556	52	13	24.5	14,900	6.51	388	3,900	859	450	1740	81.9	4,100	3,000	4.70	6.8	11,464
LR-67-01-814B	19960328	10:33	726	48	13	26.0	14,670	6.30	360	4,000	847	456	1600	86.6	4,050	2,496	6.00	6.7	12,076
	19960627	11:00	726	55	13	26.0	14,720	6.45	372	4,100	865	468	2110	96.0	3,800	2,847	5.75	7.2	12,054
	19960930	11:58	726	58	13	26.0	14,730	6.44	380	3,700	879	460	1792	81.3	3,950	3,010	3.75	6.9	11,676
LR-67-09-111	19960925	09:37	264	27	350	22.7	592	7.01	257.2	268	68	16	11.9	<1	30	26	0.11	6.1	388

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Medina County

State well Number	Date sampled	Time sampled	Depth of Well, (ft)	Pump or Flow Period Prior to Smpling (min)	Flow Rate, (gpm)	Water temperature (°C)	Specific concuctance (µS/cm)	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as $CaCO_3$)	Megnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO_4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved Solids (mg/L)
TD-68-26-701	19960213	09:40	715	70		23.0	536	7.1	200	256	68	21	9.8	1.7	18	35	0.33	6.72	308
TD-68-33-202	19960208	14:15	279	44	15	22.5	460	7.2	190	220	66	11	8.9	<1	16	23	0.17	7.90	248
TD-68-41-303	19960612	15:25	717	73		26.5	494	7.3	199	228	66	15	11	<1	27	18	0.22	5.90	296
TD-69-29-901	19960610	10:50	276	45	19	23.0	437	7.1	200	214	75	7	8.2	<1	14	10	0.14	6.10	252
TD-69-37-302	19960610	12:40	410	50	20	23.0	494	6.9	208	236	74	13	9.9	<1	17	16	0.2	4.60	284
TD-69-40-403	19960208	11:50	518	>1440	1600	23.0	471	7.2	220	236	73	11	8.4	1.2	15	7	0.17	5.14	244
TD-69-45-6a1	19960726	13:43		28	15	24.0	470	7.5	210	220	46	28	10.2	<1	19	14	2.85	5.30	224
TD-69-45-6a2	19960726	13:37		28	15	23.5	484	7.7	212	212	50	26	13.3	<1	23	14	1.76	5.30	248
TD-69-46-601	19960610	13:50	1290	>160		24.0	476	7.1	195	228	66	15	9.9	<1	19	18	0.2	6.00	276
TD-69-47-301	19960614	13:25	1510	17	900	24.5	474	7.2	202	220	65	16	10.2	<1	18	18	0.2	4.90	232
TD-69-54-199	19960607	11:55	1300	85	38	23.5	650	7.2	209	240	68	16	33.2	<1	66	14	0.2	6.10	362
TD-69-54-401	19960611	14:48	2000	58	15	24.5	515	7.3	193	224	51	16	15.6	<1	33	18	0.32	5.80	264
TD-69-56-508	19960213	11:50	2715	1440		34.0	485	7.2	190	228	51	22	11.6	1.2	22	26	0.69	7.84	264
	19960528	13:50	2715	120	1200	32.0	506	7.3	190	232	51	23	11.4	<1	32	27	0.83	6.00	300
TD-69-63-103	19960530	10:30	3410	>660	200	43.5	562	7.3	180	244	53	22	13.5	<1	23	56	1.8	9.30	316
	19960625	14:08	3410	249		42.5	609	7.1	215	220	50	21	37.6	2.3	46	42	3.6	9.00	352

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Uvalde County

State well Number	Date sampled	Time sampled	Depth of Well, (ft)	Pump or Flow Period Prior to Smpling (min)	Flow Rate, (gpm)	Water temperature (°C)	Specific conductance (µS/cm)	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as $CaCO_3$)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO_4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved Solids (mg/L)
YP-69-38-702	19960625	11:13	538	>1440		23.0	469	7.2	170	220	62	17	11.8	1.4	31	15	0.17	4.7	280
YP-69-38-704	19960314	09:50		1440		23.0	490	7.3	190	220	58	18	10.4	1.1	42	11	0.15	5.5	242
	19960625	11:40				23.0	475	7.2	179										
YP-69-43-304	19960612	11:33	752	>1440		27.5	480	7.3	192	216	63	11	12.7	<1	26	11	0.13	6.0	240
YP-69-43-606	19960611	13:28	698	23		23.5	506	7.1	194	224	75	10	11.5	<1	28	13	0.14	6.0	228
YP-69-43-903	19960612	13:38		>1440		25.5	834	7.3	202	140	83	19	35.8	<1	71	124	1.00	6.2	488
YP-69-43-904	19960612	14:18		>1440		25.0	694	7.1	196	288	77	17	22.8	<1	72	51	0.46	5.1	428
YP-69-44-102	19960612	12:28	659	>1440		23.0	498	7.3	193	224	53	12	13.9	<1	29	13	0.12	5.9	232
YP-69-44-402	19960611	11:28		>1440	1200	23.5	556	7.4	191	240	63	12	12.5	<1	40	13	0.14	6.3	236
YP-69-44-502	19960611	10:28	1380	>1440		28.5	630	7.1	188	276	68	17	14.2	<1	70	22	0.38	6.5	368
YP-69-44-803	19960614	11:20	1500	>1440		30.0	590	7.2	196	244	68	18	22.9	1.9	44	54	0.92	5.7	320
YP-69-44-8a1	19960614	10:50	1200	>1440		29.5	599	7.2	203	248	66	19	20.9	1.7	34	53	1.48	3.4	372
YP-69-45-405	19960612	10:25	1210	>120	590	23.0	482	7.4	206	228	67	14	10	<1	19	19	0.23	6.0	256
YP-69-50-207	19960702	12:25	265			23.5	567	7.0	209	248	64	11	17.4	2.9	46	18	0.09	5.4	296
YP-69-50-508	19960702	11:45	525			24.0	573	7.0	212	248	68	9	18.1	2.8	42	21	0.14	5.8	260
YP-69-51-102	19960228	11:35	391	35	50	25.0	764	6.8	240	336	107	15	22	0.4	58	63	0.60	6.9	512
	19960410	13:30	391																
	19960702	10:52	391	22		25.0	686	6.9	214	304	102	14	21.5	3	42	73	0.92	7.7	372
YP-69-51-114	19960228	12:30	565	60	175	24.5	928	7.0	250	372	123	15	38.3	<1	100	48	0.52	8.4	620

Water-quality data from streams and rivers crossing Edwards Aquifer region sampled in 1996

Surface-water data-1996

River or Stream	Date sampled	Time sampled	Discharge, (cfs)	Water temperature °C	Specific conductance (µS/cm)	pH standard units	Alkalinity $CaCO_3$ (mg/L)	Hardness (mg/L) as $CaCO_3$	Calcium, dissolved (mg/L) as $CaCO_3$	Magnesium, dissolved (mg/L) as Mg	Sodium, dissolved (mg/L) as Na	Potassium, dissolved (mg/L) as K	Chloride, dissolved (mg/L) as Cl	Sulfate, dissolved (mg/L) as SO_4	Fluoride, dissolved (mg/L) as F	Silica, dissolved (mg/L) as SiO_2	Total dissolved solids (mg/L)	Nitrogen, ammonia dissolved (mg/L) as N	Nitrogen, Nitrate dissolved (mg/L) as N
Medina River @ Bandera, Tx	19960304	11:15	36.0	14.0	575	7.8	160	276	77	21	7.6	<1.0	16	94	0.32	7.7	364	<0.03	0.32
Medina River @ Bandera, Tx	19960730	10:00	0.04	26.5	550	7.9	133	252	71	22	9.7	<1.0	26	124	0.46	7.8	364	0.03	0.03
Medina River @ Bandera, Tx	19961209	11:00	67.8	13.0	560	7.8	184	268	75	20	6.3	<1.0	18	85	0.32	5.0	398	0.03	0.61
Hondo Creek nr Tarpley, Tx	19960304	13:15	2.70	16.0	430	7.7	150	200	62	12	7.6	<1	16	46	0.23	7.7	272	<0.03	0.03
Hondo Creek nr Tarpley, Tx	19960730	11:50	NA	30.0	428	8.1	106	184	50	14	12.7	<1	25	60	0.40	9.3	284	0.06	0.03
Hondo Creek nr Tarpley, Tx	19961209	13:00	5.00	14.0	465	7.4	114	204	65	14	6.0	<1	23	60	0.30	4.2	308	<0.03	0.16
Nueces River @ Laguna, Tx	19960305	09:20	55.0	18.5	415	7.9	160	194	57	14	9.1	<1	20	14	0.12	5.9	244	<0.03	0.72
Nueces River @ Laguna, Tx	19960731	10:00	22.0	28.5	408	7.8	180	188	56	15	9.1	<1	22	15	0.21	6.3	188	0.04	0.40
Nueces River @ Laguna, Tx	19961210	09:20	1,760	17.5	481	8.5	194	216	64	15	7.4	<1	19	16	0.14	5.2	272	<0.03	0.93
Dry Frio River nr Reagan Wells, Tx	19960305	11:25	58.0	18.0	393	7.8	160	184	55	13	7.9	<1	17	16	0.06	3.5	232	<0.03	0.51
Dry Frio River nr Reagan Wells, Tx	19960731	11:45	14.0	28.5	405	7.9	180	192	60	14	8.3	<1	22	16	0.17	6.3	212	0.04	0.07
Dry Frio River nr Reagan Wells, Tx	19961210	11:00	35.0	16.0	439	7.0	196	212	67	13	5.5	<1	16	17	0.12	4.3	276	<0.03	0.87
Frio River @ Concan, Tx	19960305	12:50	58.0	18.0	414	7.8	180	196	57	14	8.6	<1	17	17	0.12	5.4	240	<0.03	0.71
Frio River @ Concan, Tx	19960731	13:10	9.30	29.0	353	7.9	150	156	42	15	8.6	<1	20	19	0.26	6.5	168	0.03	0.21
Frio River @ Concan, Tx	19961210	12:20	129	16.0	449	7.8	199	208	64	15	6.2	<1	17	16	0.15	5.1	276	<0.03	1.22
Sabinal River nr Sabinal, Tx	19960306	10:35	19.1	17.5	484	7.8	180	224	68	14	10.0	<1	18	31	0.22	8.1	256	<0.03	0.08
Sabinal River nr Sabinal, Tx	19960730	14:00	0.54	31.5	457	7.8	181	208	64	14	9.8	<1	30	35	0.24	8.0	252	0.1	0.04
Sabinal River nr Sabinal, Tx	19961211	09:45	32.0	15.5	509	7.8	206	240	77	15	6.9	<1	17	36	0.24	5.9	304	<0.03	0.36
Seco Creek @ Miller Ranch nr Utopia, Tx	19960306	12:35	1.26	22.5	407	8.1	140	188	59	12	9.3	<1	17	49	0.24	8.5	260	<0.03	0.15
Seco Creek @ Miller Ranch nr Utopia, Tx	19960731	DRY	0.0																
Seco Creek @ Miller Ranch nr Utopia, Tx	19961206	11:15	2.20	17.5	484	7.8	142	228	76	15	5.2	<1	15	65	0.32	4.6	352	<0.03	0.16

River or Stream	Date sampled	Nitrogen, Nitrite dissolved (mg/L) as N	Nitrogen, Kjeldahl Total (mg/L) as N	Total organic carbon (mg/L as C)	Oxygen, dissolved (mg/L)	Biochemical oxygen demand 5 day (mg/L)	Bacteria, Fecal, coliform (cols./ 100 ml)	Bacteria, fecal, streptococci (cols./ 100 ml)	Bacteria, coliform, Total, (cols./ 100 ml)	Solids, suspended, total (mg/L)
Medina River @ Bandera, Tx	19960304	<0.005	0.3	13.30	9.2	<1	32	28	40	<1.0
Medina River @ Bandera, Tx	19960730	<0.005	0.4	2.10	6.4	<1	24	28	60	3.0
Medina River @ Bandera, Tx	19961209	<0.005	<0.01	1.10	8.6	<1	22	20	100	2.0
Hondo Creek nr Tarpley, Tx	19960304	<0.005	1.10	11.80	8.6	<1	29	37	50	7
Hondo Creek nr Tarpley, Tx	19960730	<0.005	0.60	4.10	6.8	<1	6	20	<10	5
Hondo Creek nr Tarpley, Tx	19961209	<0.005	0.19	1.30	9.8	<1	10	42	50	2
Nueces River @ Laguna, Tx	19960305	<0.005	3.10	7.16	8.1	<1	40	28	80	<1
Nueces River @ Laguna, Tx	19960731	<0.005	0.20	<1	6.2	<1	52	8	100	2
Nueces River @ Laguna, Tx	19961210	<0.005	0.28	1.10	8.5	<1	6	18	20	3
Dry Frio River nr Reagan Wells, Tx	19960305	<0.005	0.30	43.12	8.5	<1	76	64	200	<1
Dry Frio River nr Reagan Wells, Tx	19960731	<0.005	0.30	1.60	7.3	<1	76	92	100	4
Dry Frio River nr Reagan Wells, Tx	19961210	<0.005	0.28	1.20	9.4	<1	8	8	30	1
Frio River @ Concan, Tx	19960305	<0.005	7.00	7.97	8.8	<1	60	28	80	<1
Frio River @ Concan, Tx	19960731	<0.005	0.65	1.50	7.2	<1	22	10	100	3
Frio River @ Concan, Tx	19961210	<0.005	0.19	<1.0	7.8	<1	32	16	20	2
Sabinal River nr Sabinal, Tx	19960306	<0.005	7.0	8.34	8.2	<1	44	20	70	<1
Sabinal River nr Sabinal, Tx	19960730	<0.005	<0.1	1.60	6.8	<1	12	20	100	11
Sabinal River nr Sabinal, Tx	19961211	<0.005	0.28	>1.0	8.9	1	66	12	20	1
Seco Creek @ Miller Ranch nr Utopia, Tx	19960306	<0.005	7.0	8.90	8.9	<1	124	16	150	19
Seco Creek @ Miller Ranch nr Utopia, Tx	19960731									
Seco Creek @ Miller Ranch nr Utopia, Tx	19961206	<0.005	0.28	<1.0	9.8	<1	NA	NA	NA	<1

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Bexar County

State well number	Date sampled	Time sampled	Depth of well (ft)	Pump or flow period prior to sampling (min)	Flow rate (gpm)	Water temperature °C	Specific conductance µS/cm	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved solids (mg/L)
AY-68-37-521	19960126	11:18	1,275	98	12.0	32.0	5,500	6.7	232	2,240	542	208	571	36.4	900	1,692	4.50	9.4	4,666
	19960218	11:39	1,275	91	12.0	31.0	5,450	6.9	220	2,220	513	204	472	35.7	880	1,244	6.25	9.0	4,352
	19960326	10:57	1,275	142	12.0	31.0	5,460	6.8	233	2,220	548	212	380	33.2	890	1,620	3.25	9.0	4,408
	19960425	11:30	1,275	102	11.0	30.5	5,390	6.7	240	2,200	535	209	394	32.1	850	1,505	4.25	8.8	4,426
	19960531	12:35	1,275	155	8.0	31.0	5,430	6.5	244	2,160	535	213	301	30.9	870	1,790	4.90	9.6	4,784
	19960626	19:40	1,275	190	12.0	31.0	5,350	6.7	248	2,300	558	205	444	29.5	900	1,915	2.75	8.7	4,592
	19960731	16:00	1,275	250	12.0	31.5	5,340	6.8	216	2,140	598	212	494	30.7	1,200	1,998	4.75	8.3	4,388
	19960828	13:17	1,275	157	12.0	30.5	5,380	6.7	200	2,100	554	214	489	31.1	870	1,882	4.50	9.2	4,540
	19960925	13:35	1,275	175	12.0	31.0	5,380	6.7	246	2,200	555	202	499	26.1	880	1,970	5.00	7.7	4,516
	19961025	14:11	1,275	249	12.0	31.5	5,490	6.7	239	2,450	532	193	688	31.1	930	1,918	4.00	8.9	4,540
	19961125	14:49	1,275	229	12.0	31.0	5,470	6.6	235	2,300	547	202	494	28.9	920	1,928	4.75	7.6	4,530
	19961230	14:15	1,275	313	12.0	31.5	5,480	6.7	244	2,250	556	203	484	29.4	900	1,980	4.75	8.9	4,408
AY-68-37-522	19960126	11:21	1,075	100	12.0	31.0	4,100	6.8	220	1,840	394	149	475	28.9	650	1,313	3.50	7.4	3,400
	19960218	11:42	1,075	90	12.0	30.1	4,120	7.0	210	1,700	398	147	352	29.4	660	950	5.25	7.6	3,056
	19960326	11:03	1,075	143	12.0	30.3	4,110	6.9	210	1,560	404	151	297	27.2	630	834	2.50	7.8	3,304
	19960425	11:34	1,075	108	11.0	30.6	4,140	6.9	230	1,600	400	150	293	26.0	630	1,133	4.00	7.9	3,248
	19960531	11:15	1,075	75	9.7	29.0	4,160	6.6	226	1,560	402	154	225	24.6	640	1,328	4.10	8.5	3,532
	19960626	17:08	1,075	63	12.0	30.5	4,080	6.9	222	1,550	396	151	351	22.8	640	1,368	3.75	8.3	3,384
	19960731	13:40	1,075	115	11.1	30.5	4,060	6.9	224	1,560	417	155	314	25.3	660	1,312	5.00	8.0	3,240
	19960827	13:55	1,075	175	12.0	30.0	4,090	6.8	182	1,550	412	147	346	36.3	660	1,398	4.00	9.0	3,350
	19960925	12:45	1,075	125	12.0	30.0	4,110	6.7	222	1,550	416	150	368	20.6	670	1,424	4.00	7.2	3,296
	19961025	13:38	1,075	218	12.0	30.0	4,130	6.7	222	1,600	388	140	254	25.7	660	1,422	3.75	8.0	3,248
	19961125	13:56	1,075	176	12.0	30.0	4,110	6.8	217	1,700	414	147	311	23.0	680	1,445	3.00	7.9	3,224
	19961230	13:45	1,075	285	12.0	31.0	4,110	6.8	216	1,650	400	148	339	23.2	650	1,439	4.00	1.0	3,284
AY-68-37-523	19960126	11:24	1,175	101	12.0	31.0	5,700	6.7	240	2,260	541	215	755	38.2	910	1,682	4.25	6.5	4,866
	19960218	11:45	1,175	95	12.0	30.0	5,650	6.9	220	2,260	568	230	595	38.2	940	1,649	5.75	6.6	4,436
	19960326	11:00	1,175	145	12.0	30.0	5,640	6.8	240	2,320	532	217	488	34.2	920	1,410	5.25	8.4	4,616
	19960425	11:27	1,175	102	11.0	30.0	5,690	6.7	250	2,200	542	218	437	33.2	920	1,491	4.50	8.5	4,536
	19960531	13:05	1,175	185	4.8	30.0	5,660	6.5	248	2,220	537	222	448	25.1	1,100	1,710	5.50	7.2	4,956
	19960626	18:45	1,175	135	12.0	30.5	5,600	6.7	244	2,350	537	221	471	28.3	950	1,973	5.25	8.7	4,703
	19960731	14:55	1,175	185	10.4	31.0	5,560	6.7	216	2,120	583	217	496	32.4	1,250	1,940	6.15	8.6	4,564
	19960827	15:35	1,175	275	12.0	30.0	5,600	6.7	201	2,050	553	232	573	33.1	940	1,872	4.50	7.9	4,680
	19960925	14:17	1,175	216	12.0	30.5	5,580	6.7	248	2,200	544	212	541	27.7	960	1,990	4.75	8.0	4,656
	19961025	14:36	1,175	275	12.0	30.0	5,710	6.7	244	2,250	521	205	470	32.1	970	2,004	4.25	8.3	4,726
	19961125	15:10	1,175	250	12.0	30.0	5,660	6.7	238	2,350	541	213	510	29.9	960	1,863	4.5	8.3	4,548
	19961230	14:42	1,175	342	12.0	30.5	5,630	6.7	242	2,350	570	222	497	30.6	940	2,029	6.4	8.4	4,568
AY-68-37-524	19960126	10:30	881	64	14.0	28.5	906	7.4	200	370	91	31	76.4	5.8	76	181	1.33	3.8	600
	19960218	10:52	881	55	14.0	28.0	914	7.4	200	360	94	33	53.2	5.7	60	121	1.49	5.8	504
	19960326	09:58	881	98	14.0	27.5	913	7.1	192	360	92	33	42.7	4.8	76	136	1.24	6.4	548
	19960425	10:40	881	66	11.0	28.5	918	7.4	200	350	92	33	42.9	4.5	78	131	1.31	6.5	568
	19960529	14:40	881	190	12.0	28.5	926	7.0	202	380	91	32	53.1	3.9	80	183	1.48	6.4	592
	19960626	14:55	881	425	8.8	28.0	918	7.2	196	372	95	34	50.4	5.3	80	178	1.37	6.6	652
	19960724	15:45	881	165	5.4	27.5	914	7.3	187	360	100	34	54.3	3.8	100	157	1.42	6.3	584
	19960823	15:25	881	265	12.0	28.5	915	7.2	182	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	19960925	14:50	881	275	12.0	29.0	917	7.2	202	340	94	32	62.5	7.2	95	160	1.38	6.6	616
	19961025	15:23	881	303	12.0	28.5	932	7.1	238	370	87	31	41.8	3.9	105	187	1.44	6.6	600
	19961125	16:41	881	331	12.0	27.5	922	7.2	199	370	91	33	45.2	3.4	105	172	1.66	6.3	592
	19961230	15:29	881	374	12.0	28.5	923	7.2	202	370	98	33	51	4	95	187	1.59	6.4	632
AY-68-37-525	19960126	10:33	1,150	65	12.0	28.5	6,350	6.8	236	2,520	563	253	772	42.9	1,350	1,875	4.75	4.9	5,248
	19960218	10:57	1,150	59	12.0	27.5	6,290	6.9	240	2,540	578	261	580	41.1	1,350	1,456	7.00	8.6	5,056
	19960326	09:52	1,150	90	12.0	28.0	6,310	6.8	248	2,600	573	260	468	37.6	1,350	1,661	3.50	8.7	4,996
	19960425	10:43	1,150	68	11.0	27.5	6,340	6.9	245	2,500	573	265	498	36.0	1,300	1,775	4.75	8.4	5,174
	19960529	15:10	1,150	220	3.0	28.0	6,310	6.7	260	2,520	552	250	541	35.1	1,140	2,059	2.75	8.5	5,284
	19960626	15:25	1,150	95	12.0	29.5	6,160	6.8	243	2,350	559	267	586	30.2	1,450	1,124	4.75	8.6	5,320
	19960726	14:55	1,150	115	11.0	29.0	6,190	6.7	252	2,400	616	259	554	35.6	1,400	1,666	5.75	8.9	5,280

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Bexar County

State well number	Date sampled	Time sampled	Depth of well (ft)	Pump or flow period prior to sampling (min)	Flow rate (gpm)	Water temperature °C	Specific conductance µS/cm	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved solids (mg/L)
	19960827	16:40	1,150	320	12.0	26.0	6,290	6.8	262	2,450	595	262	566	36.6	1,300	2,152	5.00	8.2	5,300
	19960925	15:43	1,150	333	12.0	29.0	6,340	6.7	264	2,500	622	267	601	33.3	1,400	2,280	5.25	6.1	5,340
	19961025	15:52	1,150	332	12.0	26.5	6,340	6.7	264	2,550	570	245	542	35.1	1,400	2,276	4.75	6.4	5,348
	19961125	17:11	1,150	361	12.0	27.0	6,420	6.7	257	2,650	600	263	588	33.7	1,350	2,270	5.75	6.4	5,264
	19961230	15:55	1,150	400	12.0	29.0	6,360	6.7	260	2,600	602	263	567	34.7	1,400	2,130	5.40	6.2	5,218
AY-68-37-526	19960126	12:00	1,223	161	13.0	26.5	840	7.3	190	350	87	30	58.5	3.8	74	122	0.65	5.3	532
	19960216	12:30	1,223	159	13.0	26.0	843	7.4	200	350	93	30	41.2	3.4	74	95	0.65	5.3	574
	19960326	14:25	1,223	170	13.0	25.5	805	7.4	200	350	84	31	31.7	2.4	70	105	0.55	5.1	508
	19960425	12:24	1,223	174	10.0	25.0	868	7.8	200	260	56	24	19	1.2	40	48	0.47	4.6	340
	19960529	13:35	1,223	149	12.0	28.0	901	7.3	203	370	83	32	39	2.2	80	156	0.68	5.5	560
	19960625	14:30	1,223	225	12.5	26.5	909	7.2	195	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	19960726	12:26	1,223	210	11.1	27.0	860	7.4	179	340	83	32	38.4	2	80	139	0.66	5.6	512
	19960823	14:16	1,223	218	12.0	27.0	844	7.3	166	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	19960927	15:10	1,223	355	12.0	25.5	802	7.3	203	320	86	30	35.6	3.5	70	139	0.69	3.9	504
	19961029	15:25	1,223	250	12.0	27.0	824	7.2	204	336	87	30	30.6	2.1	74	140	0.72	5.6	554
	19961127	13:56	1,223	206	12.0	25.0	802	7.4	202	328	86	28	34.5	1.8	72	123	0.67	5.7	496
	19961230	17:19	1,223	469	12.0	25.5	790	7.3	208	312	84	27	30.3	1.9	62	111	0.62	5.3	476
AY-68-37-527	19960126	12:05	926	166	25.0	27.0	530	7.3	200	232	66	18	17.4	1.8	34	31	0.31	5.2	300
	19960216	12:25	926	156	25.0	26.5	540	7.2	220	252	68	19	15.7	1.3	36	31	0.40	5.6	276
	19960326	14:15	926	160	25.0	25.5	530	7.3	200	244	64	18	11.4	<1.0	36	27	0.49	5.5	296
	19960425	12:20	926	270	25.0	27.0	530	7.2	200	240	60	19	12.4	<1.0	34	30	0.37	5.5	300
	19960531	14:15	926	285	12.0	26.5	525	7.1	199	228	65	19	9.8	<1.0	36	32	0.26	5.6	308
	19960626	16:50	926	275	12.0	26.5	521	7.4	196	242	66	19	16.0	2.6	31	31	0.30	5.4	312
	19960724	16:35	926	455	12.0	28.0	490	7.4	200	224	66	18	12.6	<1.0	30	28	0.27	5.7	296
	19960822	16:50	926	330	12.0	26.0	527	7.3	200	230	65	17	13.0	1.4	26	33	0.40	12	268
	19960927	14:48	926	330	12.0	27.0	510	7.3	204	220	65	19	13.1	<1.0	29	34	0.30	5.6	296
	19961031	16:21	926	331	25.0	27.5	527	7.3	204	240	66	18	12.6	<1.0	34	36	0.30	5.6	308
	19961125	16:01	926	266	25.0	27.0	526	7.4	200	240	65	19	13.0	<1.0	30	33	0.32	5.6	304
	19961230	16:51	926	441	25.0	26.5	520	7.4	204	232	67	18	12.3	<1.0	28	33	0.28	5.4	304
AY-68-37-604	19960530	11:15	NA	285	NA	27.0	500	7.5	198	228	64	17	9.6	<1	34	20	0.29	4.3	288
AY-68-37-508	19960530	10:30	NA	35	NA	27.0	490	7.5	198	228	62	17	8.7	<1	34	21	0.3	6.3	284
AY-68-37-705	19960530	09:15	NA	35	NA	27.0	490	7.5	200	228	62	17	9.2	<1	32	20	0.3	5.8	280
AY-68-38-107	19960530	12:15	NA	45	NA	27.5	510	7.5	200	238	63	18	11.4	<1	38	29	0.35	3.7	288
AY-68-30-601	19960620	15:18	700	23	900	28.0	536	7.0	190	240	64	19	13.6	1.4	33	34	0.41	5.8	348
AY-68-29-109	19960709	14:22	460	>1440	250.0	23.5	604	6.7	267	292	94	16	6.1	<1	32	10	0.12	5.9	304
AY-68-29-401	19960709	13:55	517	20	650.0	24.5	560	6.9	265	260	81	19	5.1	<1	28	10	0.14	5.4	292
AY-68-28-203	19960723	09:30	435	>180	240	23.5	508	7	238	246	80	11	9	<1	18	9	0.18	5.7	292
AY-68-28-501	19960723	10:00	469	>180	125	23.5	563	6.9	251	256	98	5	9.5	<1	25	7	0.09	5.4	340
AY-68-28-404	19960829	13:43	NA	>1440	NA	22.5	600	6.9	274	264	91	18	10.6	<1	26	19	0.19	4.9	340
AY-68-28-702	19960905	10:25	450	30	1150	22.0	573	7.1	250	280	84	17	10.5	<1	26	23	0.3	5.4	360
AY-68-29-405	19960905	07:25	NA	240	NA	23.0	673	6.9	299	330	116	10	11.1	<1	28	14	0.14	6.5	428
AY-68-35-203	19960905	14:30	540	>1440	NA	24.0	496	7.1	201	228	68	18	10	<1	26	29	0.24	5.7	328
AY-68-28-508	19960906	09:20	464	>1440	NA	23.0	536	7.2	229	240	84	12	9.9	<1	28	22	0.22	5.6	336
AY-68-29-303	19960916	09:55	527	>1440	400.0	22.0	488	7.1	203	208	76	8	8	<1	16	20	0.14	4.9	304

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Comal County

State Well ID Number	Date	Time	Depth of Well, Total Feet	Pump or Flow Period Prior to Smplng (min)	Flow Rate, Inst (gpm)	Water Temp °C	Specific Conductance µS/cm	pH stdrd units	Alkalinity, Fix End Field, $CaCO_3$ mg/L	Hardness Total mg/L as $CaCO_3$	Calcium, dissolved mg/L as $CaCO_3$	Magnesium, dissolved mg/L as Mg	Sodium, dissolved mg/L as Na	Potassium, dissolved mg/L as K	Chloride, dissolved mg/L as Cl	Sulfate, dissolved mg/L as SO_4	Fluoride, dissolved mg/L as F	Silica, dissolved mg/L as SiO_2	Total dissolved solids mg/L
DX-68-16-502	19960925	14:53	260	23	250	23.0	560	7.0	265	264	67	17	10.2	<1	28	23	0.21	6.2	356
DX-68-22-901	19960926	10:57	255	20	1650	22.5	506	6.9	237	232	79	12	8.5	<1	16	10	0.16	5.3	260
DX-68-22-902	19960926	11:27	240	17	850	22.0	524	6.9	245	244	64	12	8.9	<1	16	11	0.17	5.2	264
DX-68-23-301	19960528	13:55	23.5	635		23.5	535	7.4	230	256	71	18	9.9	<1	26	22	0.22	5.7	300
DX-68-23-303	19960529	15:05	1045	29	4200	25.0	551	7.0	232	272	76	18	10.4	<1	26	32	0.30	4.9	268
DX-68-23-305	19960924	14:53	110	23	2750	24.5	550	7.1	233	252	75	16	11.7	<1	23	29	0.25	6.2	348
DX-68-23-602	19960924	14:12	790	27	2750	23.0	520	7.1	234	236	77	14	10.3	<1	19	21	0.21	5.8	320
DX-68-23-616A	19960110	13:09	576	49	13	25.0	2,730	7.2	270	830	152	103	363	28.0	530	460	3.4	6.4	2,000
	19960214	12:52	576	46	13	25.5	2,950	6.9	260	840	156	103	327	26.3	530	481	3.5	6.1	1,992
	19960329	12:35	576	65	13	25.0	2,910	6.9	270	840	156	104	257	24.3	490	460	3.7	6.2	1,980
	19960412	14:00	576	65	13	25.5	2,940	7.0	240	830	155	103	260	23.6	500	608	3.6	6.5	1,888
	19960529	13:55	576	50	13	25.5	3,040	6.9	250	850	156	106	270	23.8	525	542	3.5	5.2	1,992
	19960624	14:40	576	48	13	25.5	3,030	6.9	260	1100	160	106	347	23.0	560	590	3.6	6.7	2,124
	19960722	12:27	576	43	13	25.5	2,980	6.9	270	800	152	105	308	23.5	560	568	4.2	6.6	1,972
	19960821	12:38	576	42	13	26.0	2,940	7.0	276	775	162	104	289	23.2	550	590	3.5	7.4	1,964
	19960918	11:23	576	48	13	25.5	2,870	7.0	260	800	156	99	252	22.9	550	561	3.2	7.1	1,956
	19961016	12:48	576	68	13	25.5	2,810	7.0	276	760	153	99	290	23.6	530	591	3.5	6.9	1,892
	19961121	13:48	576	53	13	25.5	2,880	7.0	268	810	155	101	297	23.6	550	585	3.6	6.9	1,956
	19961219	13:12	576	57	13	25.0	2,880	6.9	249	810	155	102	292	20.3	540	508	3.4	6.9	1,920
DX-68-23-616B	19960110	13:15	736	55	13	26.0	1,700	7.2	220	540	97	65	183	16.4	275	249	3.4	6.2	1,176
	19960214	12:55	736	49	13	26.0	1,720	7.1	230	532	96	63	156	14.3	265	231	3.4	6.3	1,144
	19960329	12:40	736	70	13	26.0	1,730	7.1	230	540	98	64	126	13.4	265	276	3.7	6.1	1,140
	19960412	14:07	736	72	13	26.5	1,740	7.1	230	532	98	66	129	12.8	265	248	3.6	6.2	1,192
	19960529	14:00	736	55	13	26.5	1,700	7.1	220	548	93	63	127	12.2	265	270	3.2	3.9	1,040
	19960624	14:41	736	48	13	26.0	1,720	7.1	212	545	98	63	175	12.2	270	267	3.4	6.3	1,200
	19960722	12:28	736	43	13	26.5	1,732	7.1	230	520	96	66	141	13.2	310	304	3.5	6.4	1,136
	19960821	12:39	736	43	13	26.0	1,736	7.2	232	510	99	63	126	12.1	300	288	3.7	6.0	1,092
	19960918	11:25	736	50	13	26.0	1,743	7.1	234	520	97	64	132	11.9	310	312	3.5	6.7	1,196
	19961016	12:54	736	74	13	26.5	1,740	7.1	236	510	104	63	145	13.0	300	311	3.5	6.5	1,096
	19961121	13:54	736	59	13	26.5	1,736	7.1	230	530	98	64	139	13.0	310	310	3.5	6.6	1,192
	19961219	13:16	736	61	13	26.0	1,741	6.9	206	530	98	65	131	10.3	290	282	3.6	6.7	1,136
DX-68-23-617	19960110	11:23	916.5	53	12	26.0	560	7.3	220	272	55	27	11.0	1.9	22	42	1.16	5.9	360
	19960214	10:20	916.5	50	11	26.0	566	7.2	210	272	56	28	12.3	2.5	21	40	1.20	5.8	360
	19960327	11:24	916.5	54	11	26.0	563	7.0	220	268	56	28	10.0	1.4	21	45	1.50	5.8	316
	19960412	11:55	916.5	65	11	26.0	563	7.2	200	268	56	26	10.5	<1.0	26	48	1.30	6.0	396
	19960529	10:40	916.5	55	11	26.5	563	7.3	200	268	56	26	10.4	<1.0	26	54	1.36	5.8	330
	19960624	10:20	916.5	45	12	26.5	566	7.3	209	268	59	27	13.9	1.4	22	55	1.30	5.8	360
	19960722	11:10	916.5	44	11	26.5	565	7.3	219	262	56	29	10.4	3.0	23	52	1.44	5.9	384
	19960821	11:33	916.5	43	11	26.5	566	7.3	222	264	59	27	11.4	1.4	22	53	1.30	6.2	340
	19960918	08:36	916.5	36	11	26.0	562	7.2	223	252	56	27	10.4	1.1	22	55	1.34	5.3	400
	19961016	11:25	916.5	70	11	26.5	564	7.3	224	248	56	27	11.4	<1.0	22	57	1.22	6.0	324
	19961121	09:27	916.5	57	11	26.0	560	7.1	214	274	52	27	12.3	1.9	21	58	1.28	6.3	396
	19961219	09:35	916.5	65	11	26.0	566	7.1	220	268	59	26	10.6	<1.0	21	58	1.27	6.4	280
DX-68-23-618	19960110	11:30	660.1	60	12	25.0	620	7.2	200	264	50	33	25.4	2.9	43	54	2.55	6.2	416
	19960214	10:28	660.1	58	12	25.0	628	7.3	200	268	51	33	25.7	3.1	42	49	2.70	6.1	388
	19960327	11:27	660.1	57	12	25.5	628	7.4	200	264	53	34	21.3	2.5	41	56	3.05	6.1	344
	19960412	12:05	660.1	95	12	25.5	618	7.4	200	256	52	34	21.6	2.1	48	56	2.55	6.3	372
	19960529	10:55	660.1	70	12	26.0	622	7.4	180	260	50	33	21.2	1.8	50	60	2.15	5.9	316
	19960624	10:40	660.1	50	12	25.5	623	7.3	198	264	51	33	28.7	2.0	43	63	2.90	6.0	406
	19960722	11:09	660.1	47	12	26.0	626	7.2	194	254	51	35	22.2	3.0	52	64	3.03	6.3	388
	19960821	11:38	660.1	48	12	26.0	621	7.4	200	248	53	34	22.3	2.2	50	63	2.85	5.8	344
	19960918	08:42	660.1	42	12	25.5	617	7.4	203	244	50	31	21.0	1.8	52	63	2.95	5.8	408
	19961016	11:15	660.1	60	12	25.5	628	7.4	208	252	50	32	25.2	1.9	48	65	2.50	6.4	356
	19961121	10:29	660.1	62	12	25.5	627	7.3	202	260	50	33	24.4	2.4	50	65	2.60	6.7	368
	19961219	10:32	660.1	53	12	25.5	627	7.0	206	260	53	34	25.6	1.7	48	62	2.50	6.6	330
DX-68-23-619A	19960110	10:04	652	54	12	25.0	540	7.2	200	252	48	30	12.8	1.8	28	38	2.40	6.4	352
	19960214	11:40	652	45	13	26.0	540	7.4	200	248	49	30	14.8	2.0	26	32	2.30	6.2	316
	19960327	10:12	652	52	12	25.0	537	7.3	200	252	50	32	12.5	<1.0	27	39	2.30	6.2	280
	19960412	10:07	652	62	12	25.0	530	7.3	210	244	50	31	13.0	1.1	30	39	2.40	6.2	354
	19960529	12:35	652	55	12	26.0	533	7.3	190	240	47	31	10.4	<1.0	32	44	2.25	5.9	288
	19960624	11:48	652	46	12	26.0	542	7.3	198	244	49	31	17.6	1.4	27	46	2.55	6.1	336
	19960722	10:08	652	43	12	26.0	540	7.2	198	238	50	32	12.8	2.0	28	42	1.02	4.3	332
	19960821	10:29	652	42	12	26.0	541	7.4	202	232	52	31	13.4	<1.0	27	45	2.40	4.9	288
	19960918	09:57	652	53	12	26.0	542	7.3	204	238	49	29	12.2	<1.0	27	46	2.95	6.5	336
	19961016	09:56	652	51	12	25.5	541	7.5	196	234	48	30	15.0	<1.0	27	46	2.35	6.4	304
	19961121	11:50	652	56	12	25.5	542	7.3	210	242	50	30	14.0	1.3	28	47	2.40	6.5	328

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Comal County

State Well ID Number	Date	Time	Depth of Well, Total Feet	Pump or Flow Period Prior to Smpling (min)	Flow Rate, Inst (gpm)	Water Temp °C	Specific Conductance µS/cm	pH stdrd units	Alkalinity, Fix End Field, $CaCO_3$ mg/L	Hardness Total mg/L as $CaCO_3$	Calcium, dissolved mg/L as $CaCO_3$	Magnesium, dissolved mg/L as Mg	Sodium, dissolved mg/L as Na	Potassium, dissolved mg/L as K	Chloride, dissolved mg/L as Cl	Sulfate, dissolved mg/L as SO_4	Fluoride, dissolved mg/L as F	Silica, dissolved mg/L as SiO_2	Total dissolved solids mg/L
	19961219	11:50	652	55	12	25.5	542	7.2	207	246	49	31	14.5	<1.0	26	42	2.50	6.6	276
DX-68-23-619S	19960110	10:10	787	60	13	26.0	560	7.1	220	266	57	27	12.2	1.1	24	40	1.49	5.9	360
	19960214	11:45	787	50	13	26.5	562	7.3	220	268	59	26	12.4	1.8	22	36	1.46	5.8	336
	19960327	10:15	787	55	13	25.5	557	7.0	220	264	58	26	10.4	<1.0	22	43	1.60	5.6	320
	19960412	10:12	787	67	13	26.0	559	7.3	220	264	61	27	11.0	<1.0	26	47	1.51	5.9	336
	19960529	12:40	787	60	13	26.5	560	7.3	220	264	57	26	10.3	<1.0	22	46	1.40	4.0	276
	19960624	12:08	787	66	13	26.5	561	7.3	212	264	57	28	14.0	<1.0	23	51	1.46	5.8	326
	19960722	10:09	787	44	11	26.5	560	7.3	215	256	57	26	10.9	1.8	23	45	0.72	4.9	346
	19960821	10:26	787	43	13	26.5	560	7.4	220	256	60	27	11.5	<1.0	24	50	1.62	6.3	328
	19960918	09:57	787	55	13	26.5	562	7.3	222	248	57	26	8.1	<1.0	30	46	1.50	4.7	358
	19961016	10:00	787	55	13	26.0	562	7.3	226	252	57	26	12.3	<1.0	30	53	1.52	6.1	300
	19961121	11:58	787	64	13	26.0	563	7.4	218	268	59	26	11.9	1.0	23	50	1.48	6.0	356
	19961219	11:56	787	61	13	26.0	563	7.0	222	266	59	26	11.2	<1.0	22	49	1.54	5.4	304

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Hays County

State well Number	Date sampled	Time sampled	Depth of Well, (ft)	Pump or Flow Period Prior to Smpling (min)	Flow Rate, (gpm)	Water temperature (°C)	Specific conductance (µS/cm)	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as $CaCO_3$)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO_4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved Solids, Sum (mg/L)
LR-58-58-403	19960904	09:58	250	17	350	22.5	595	7.11	258	280	73	26	9.4	<1	24	27	0.51	5.2	416
LR-67-01-308	19960904	11:02	650	22	400	25.0	702	7.21	219.2	340	80	40	11.5	<1	24	132	3.55	6.1	504
LR-67-01-801	19960528	12:55		>1440		22.0	590	7.30	214	282	70	19	10.4	<1	32	24	0.42	5.1	328
LR-67-01-802	19960904	13:58		>1440		23.0	614	7.02	260	280	69	17	12.2	<1	32	25	0.26	5.8	400
LR-67-01-806	19960904	13:28		>1440		23.0	824	6.94	252.8	300	90	17	12.7	<1	34	29	0.32	5.6	384
LR-67-01-812	19960326	13:28	543	48	13	24.5	14,790	6.29	370	4,100	860	459	1610	89.8	3,700	2,600	5.00	7	11,744
	19960627	14:40	543	45	13	25.0	14,840	6.68	388	4,000	869	476	1980	96.0	4,150	2,786	5.75	7.2	11,988
	19960930	14:25	543	67	13	24.5	14,790	6.49	364	3,800	868	449	1730	91.8	4,200	2,980	5.10	6.9	11,764
LR-67-01-813A	19960326	12:05	564	55	13	24.5	14,750	6.41	380	4,200	871	467	1590	85.2	3,950	2,630	6.00	6.7	11,764
	19960627	12:28	564	53	11	24.5	14,850	6.48	400	4,200	860	468	1960	96.0	3,700	2,833	6.00	7.2	12,023
	19961001	11:20	564	65	11	24.5	14,820	6.31	376	4,000	859	451	1824	76.2	4,000	2,970	4.70	6.3	11,576
LR-67-01-813B	19960326	12:08	699	58	13	25.5	14,770	6.36	370	4,100	861	481	1600	90.3	4,050	2,566	5.30	6.7	11,700
	19960627	12:30	699	55	13	25.5	14,750	6.42	368	3,700	864	460	2040	98.0	3,800	2,654	5.75	7.2	11,812
	19961001	12:33	699	61	13	25.5	14,780	6.28	380	3,700	876	460	1980	73.6	3,950	2,650	5.08	7.2	11,668
LR-67-01-814A	19960326	10:38	556	38	13	25.0	14,820	6.33	380	4,100	849	460	1580	89.8	4,050	2,460	5.00	6.9	11,980
	19960627	10:58	556	53	13	25.0	14,530	6.43	380	4,200	873	475	1910	103.0	4,050	2,834	5.75	7.5	12,184
	19960930	10:55	556	52	13	24.5	14,900	6.51	388	3,900	859	450	1740	81.9	4,100	3,000	4.70	6.8	11,464
LR-67-01-814B	19960326	10:33	726	48	13	26.0	14,670	6.30	360	4,000	847	456	1600	86.6	4,050	2,496	6.00	6.7	12,076
	19960627	11:00	726	55	13	26.0	14,720	6.45	372	4,100	885	468	2110	96.0	3,800	2,847	5.75	7.2	12,054
	19960930	11:58	726	58	13	26.0	14,730	6.44	380	3,700	879	460	1792	81.3	3,950	3,010	3.75	6.9	11,676
LR-67-09-111	19960925	09:37	264	27	350	22.7	592	7.01	257.2	268	88	16	11.9	<1	30	26	0.11	6.1	388

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Medina County

State well Number	Date sampled	Time sampled	Depth of Well, (ft)	Pump or Flow Period Prior to Smpling (min)	Flow Rate, (gpm)	Water temperature (°C)	Specific concuctance (µS/cm)	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as $CaCO_3$)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO_4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved Solids (mg/L)
TD-68-26-701	19960213	09:40	715	70		23.0	536	7.1	200	256	68	21	9.8	1.7	18	35	0.33	6.72	308
TD-68-33-202	19960208	14:15	279	44	15	22.5	460	7.2	190	220	66	11	8.9	<1	16	23	0.17	7.90	248
TD-68-41-303	19960612	15:25	717	73		26.5	494	7.3	199	228	66	15	11	<1	27	18	0.22	5.90	296
TD-69-29-901	19960610	10:50	276	45	19	23.0	437	7.1	200	214	75	7	8.2	<1	14	10	0.14	6.10	252
TD-69-37-302	19960610	12:40	410	50	20	23.0	494	6.9	208	236	74	13	9.9	<1	17	16	0.2	4.60	264
TD-69-40-403	19960208	11:50	518	>1440	1600	23.0	471	7.2	220	236	73	11	8.4	1.2	15	7	0.17	5.14	244
TD-69-45-6a1	19960726	13:43		28	15	24.0	470	7.5	210	220	48	28	10.2	<1	19	14	2.85	5.30	224
TD-69-45-6a2	19960726	13:37		28	15	23.5	484	7.7	212	212	50	26	13.3	<1	23	14	1.76	5.30	248
TD-69-46-601	19960610	13:50	1290	>180		24.0	476	7.1	195	228	66	15	9.9	<1	19	18	0.2	6.00	276
TD-69-47-301	19960614	13:25	1510	17	900	24.5	474	7.2	202	220	65	16	10.2	<1	18	18	0.2	4.90	232
TD-69-54-199	19960607	11:55	1300	85	38	23.5	650	7.2	209	240	68	16	33.2	<1	68	14	0.2	6.10	362
TD-69-54-401	19960611	14:48	2000	58	15	24.5	515	7.3	193	224	51	16	15.6	<1	33	18	0.32	5.80	264
TD-69-56-508	19960213	11:50	2715	1440		34.0	485	7.2	190	228	51	22	11.6	1.2	22	26	0.69	7.84	264
	19960528	13:50	2715	120	1200	32.0	506	7.3	190	232	51	23	11.4	<1	32	27	0.83	6.00	300
TD-69-63-103	19960530	10:30	3410	>660	200	43.5	562	7.3	180	244	53	22	13.5	<1	23	56	1.8	8.30	316
	19960625	14:08	3410	249		42.5	609	7.1	215	220	50	21	37.6	2.3	46	42	3.6	9.00	352

Water-quality data for
Edwards Aquifer wells and springs
sampled in 1996

Uvalde County

State well Number	Date sampled	Time sampled	Depth of Well, (ft)	Pump or Flow Period Prior to Smpling (min)	Flow Rate, (gpm)	Water temperature (°C)	Specific concuctance (µS/cm)	pH (standard units)	Alkalinity, field (mg/L as $CaCO_3$)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as $CaCO_3$)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Chloride, dissolved (mg/L as Cl)	Sulfate, dissolved (mg/L as SO_4)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Total dissolved Solids (mg/L)
YP-69-36-702	19960625	11:13	538	>1440		23.0	489	7.2	170	220	62	17	11.8	1.4	31	15	0.17	4.7	260
YP-69-36-704	19960314	09:50		1440		23.0	490	7.3	190	220	58	16	10.4	1.1	42	11	0.15	5.5	242
	19960625	11:40				23.0	475	7.2	179										
YP-69-43-304	19960612	11:33	752	>1440		27.5	480	7.3	192	216	63	11	12.7	<1	28	11	0.13	6.0	240
YP-69-43-606	19960611	13:28	698	23		23.5	506	7.1	194	224	75	10	11.5	<1	28	13	0.14	6.0	228
YP-69-43-903	19960612	13:38		>1440		25.5	834	7.3	202	140	63	19	35.8	<1	71	124	1.00	6.2	488
YP-69-43-904	19960612	14:18		>1440		25.0	694	7.1	196	288	77	17	22.8	<1	72	51	0.46	5.1	428
YP-69-44-102	19960612	12:28	659	>1440		23.0	498	7.3	193	224	53	12	13.9	<1	29	13	0.12	5.9	232
YP-69-44-402	19960611	11:28		>1440	1200	23.5	556	7.4	191	240	63	12	12.5	<1	40	13	0.14	6.3	236
YP-69-44-502	19960611	10:28	1380	>1440		28.5	630	7.1	188	276	68	17	14.2	<1	70	22	0.38	6.5	368
YP-69-44-603	19960614	11:20	1500	>1440		30.0	590	7.2	196	244	68	16	22.9	1.9	44	54	0.92	5.7	320
YP-69-44-8a1	19960614	10:50	1200	>1440		29.5	599	7.2	203	248	66	19	20.9	1.7	34	53	1.48	3.4	372
YP-69-45-405	19960612	10:25	1210	>120	590	23.0	482	7.4	206	228	67	14	10	<1	19	19	0.23	6.0	256
YP-69-50-207	19960702	12:25	265			23.5	567	7.0	209	248	84	11	17.4	2.9	46	18	0.09	5.4	296
YP-69-50-506	19960702	11:45	525			24.0	573	7.0	212	248	88	9	18.1	2.6	42	21	0.14	5.8	260
YP-69-51-102	19960228	11:35	391	35	50	25.0	764	6.8	240	336	107	15	22	0.4	58	63	0.80	6.9	512
	19960410	13:30	391																
	19960702	10:52	391	22		25.0	686	6.9	214	304	102	14	21.5	3	42	73	0.92	7.7	372
YP-69-51-114	19960228	12:30	565	80	175	24.5	928	7.0	250	372	123	15	38.3	<1	100	48	0.52	8.4	620

Water-quality data from streams and rivers crossing Edwards Aquifer region sampled in 1996

Surface-water data-1996

River or Stream	Date sampled	Time sampled	Discharge, (cfs)	Water temperature °C	Specific conductance (µS/cm)	pH standard units	Alkalinity $CaCO_3$ (mg/L)	Hardness (mg/L) as $CaCO_3$	Calcium, dissolved (mg/L) as $CaCO_3$	Magnesium, dissolved (mg/L) as Mg	Sodium, dissolved (mg/L) as Na	Potassium, dissolved (mg/L) as K	Chloride, dissolved (mg/L) as Cl	Sulfate, dissolved (mg/L) as SO_4	Fluoride, dissolved (mg/L) as F	Silica, dissolved (mg/L) as SiO_2	Total dissolved solids (mg/L)	Nitrogen, ammonia dissolved (mg/L) as N	Nitrogen, Nitrate dissolved (mg/L) as N
Medina River @ Bandera, Tx	19960304	11:15	36.0	14.0	575	7.8	160	276	77	21	7.6	<1.0	16	94	0.32	7.7	364	<0.03	0.32
Medina River @ Bandera, Tx	19960730	10:00	0.04	26.5	550	7.9	133	252	71	22	9.7	<1.0	26	124	0.40	7.6	364	0.03	0.03
Medina River @ Bandera, Tx	19961209	11:00	67.8	13.0	560	7.8	184	268	75	20	6.3	<1.0	18	85	0.32	5.0	398	0.03	0.61
Hondo Creek nr Tarpley, Tx	19960304	13:15	2.70	18.0	430	7.7	150	200	62	12	7.8	<1	16	48	0.23	7.7	272	<0.03	0.03
Hondo Creek nr Tarpley, Tx	19960730	11:50	NA	30.0	426	8.1	106	164	50	14	12.7	<1	25	60	0.40	9.3	284	0.03	0.03
Hondo Creek nr Tarpley, Tx	19961209	13:00	5.00	14.0	485	7.4	114	204	65	14	6.0	<1	23	60	0.30	4.2	308	<0.03	0.18
Nueces River @ Laguna, Tx	19960305	09:20	55.0	18.5	415	7.9	160	194	57	14	9.1	<1	20	14	0.12	5.9	244	<0.03	0.72
Nueces River @ Laguna, Tx	19960731	10:00	22.0	28.5	408	7.6	180	188	56	15	9.1	<1	22	15	0.21	6.3	188	0.04	0.40
Nueces River @ Laguna, Tx	19961210	09:20	1,760	17.5	461	8.5	194	216	64	15	7.4	<1	19	16	0.14	5.2	272	<0.03	0.93
Dry Frio River nr Reagan Wells, Tx	19960305	11:25	58.0	18.0	393	7.8	160	184	55	13	7.9	<1	17	16	0.06	3.5	232	<0.03	0.51
Dry Frio River nr Reagan Wells, Tx	19960731	11:45	14.0	28.5	405	7.9	180	192	60	14	8.3	<1	22	16	0.17	6.3	212	0.04	0.07
Dry Frio River nr Reagan Wells, Tx	19961210	11:00	35.0	16.0	439	7.0	196	212	67	13	5.5	<1	16	17	0.12	4.3	276	<0.03	0.87
Frio River @ Concan, Tx	19960305	12:50	58.0	18.0	414	7.8	160	196	57	14	8.8	<1	17	17	0.12	5.4	240	<0.03	0.71
Frio River @ Concan, Tx	19960731	13:10	9.30	29.0	353	7.9	150	156	42	15	8.8	<1	20	19	0.26	6.5	188	0.03	0.21
Frio River @ Concan, Tx	19961210	12:20	129	16.0	449	7.9	199	208	64	15	6.2	<1	17	16	0.15	5.1	276	<0.03	1.22
Sabinal River nr Sabinal, Tx	19960306	10:35	19.1	17.5	484	7.6	180	224	66	14	10.0	<1	18	31	0.22	8.1	256	<0.03	0.08
Sabinal River nr Sabinal, Tx	19960730	14:00	0.54	31.5	457	7.6	181	208	64	14	9.8	<1	30	35	0.24	8.0	252	0.1	0.04
Sabinal River nr Sabinal, Tx	19961211	09:45	32.0	15.5	509	7.6	206	240	77	15	6.9	<1	17	36	0.24	5.9	304	<0.03	0.38
Seco Creek @ Miller Ranch nr Utopia, Tx	19960306	12:35	1.28	22.5	407	8.1	140	188	59	12	9.3	<1	17	49	0.24	8.5	260	<0.03	0.15
Seco Creek @ Miller Ranch nr Utopia, Tx	19960731	DRY	0.0																
Seco Creek @ Miller Ranch nr Utopia, Tx	19961206	11:15	2.20	17.5	484	7.8	142	228	76	15	5.2	<1	15	65	0.32	4.6	352	<0.03	0.16

River or Stream	Date sampled	Nitrogen, Nitrite dissolved (mg/L) as N	Nitrogen, Kjeldahl Total (mg/L) as N	Total organic carbon (mg/L as C)	Oxygen, dissolved (mg/L)	Biochemical oxygen demand 5 day (mg/L)	Bacteria, Fecal, coliform (cols./ 100 ml)	Bacteria, fecal, streptococci (cols./ 100 ml)	Bacteria, coliform, Total, (cols./ 100 ml)	Solids, suspended, total (mg/L)
Medina River @ Bandera, Tx	19960304	<0.005	0.3	13.30	9.2	<1	32	28	40	<1.0
Medina River @ Bandera, Tx	19960730	<0.005	0.4	2.10	6.4	<1	24	28	60	3.0
Medina River @ Bandera, Tx	19961209	<0.005	<0.01	1.10	8.8	<1	22	20	100	2.0
Hondo Creek nr Tarpley, Tx	19960304	<0.005	1.10	11.80	8.6	<1	29	37	50	7
Hondo Creek nr Tarpley, Tx	19960730	<0.005	0.60	4.10	6.8	<1	6	20	<10	5
Hondo Creek nr Tarpley, Tx	19961209	<0.005	0.19	1.30	9.8	<1	10	42	50	2
Nueces River @ Laguna, Tx	19960305	<0.005	3.10	7.16	8.1	<1	40	28	80	<1
Nueces River @ Laguna, Tx	19960731	<0.005	0.20	<1	6.2	<1	52	8	100	2
Nueces River @ Laguna, Tx	19961210	<0.005	0.28	1.10	8.5	<1	6	18	20	3
Dry Frio River nr Reagan Wells, Tx	19960305	<0.005	0.30	43.12	8.5	<1	76	64	200	<1
Dry Frio River nr Reagan Wells, Tx	19960731	<0.005	0.30	1.60	7.3	<1	76	92	100	4
Dry Frio River nr Reagan Wells, Tx	19961210	<0.005	0.28	1.20	9.4	<1	8	8	30	1
Frio River @ Concan, Tx	19960305	<0.005	7.00	7.97	8.8	<1	80	28	80	<1
Frio River @ Concan, Tx	19960731	<0.005	0.65	1.50	7.2	<1	22	10	100	3
Frio River @ Concan, Tx	19961210	<0.005	0.19	<1.0	7.8	<1	32	16	20	2
Sabinal River nr Sabinal, Tx	19960306	<0.005	7.0	8.34	8.2	<1	44	20	70	<1
Sabinal River nr Sabinal, Tx	19960730	<0.005	<0.1	1.60	6.8	<1	12	20	100	11
Sabinal River nr Sabinal, Tx	19961211	<0.005	0.28	>1.0	8.9	1	66	12	20	1
Seco Creek @ Miller Ranch nr Utopia, Tx	19960306	<0.005	7.0	8.90	8.9	<1	124	16	150	19
Seco Creek @ Miller Ranch nr Utopia, Tx	19960731									
Seco Creek @ Miller Ranch nr Utopia, Tx	19961206	<0.005	0.28	<1.0	9.8	<1	NA	NA	NA	<1

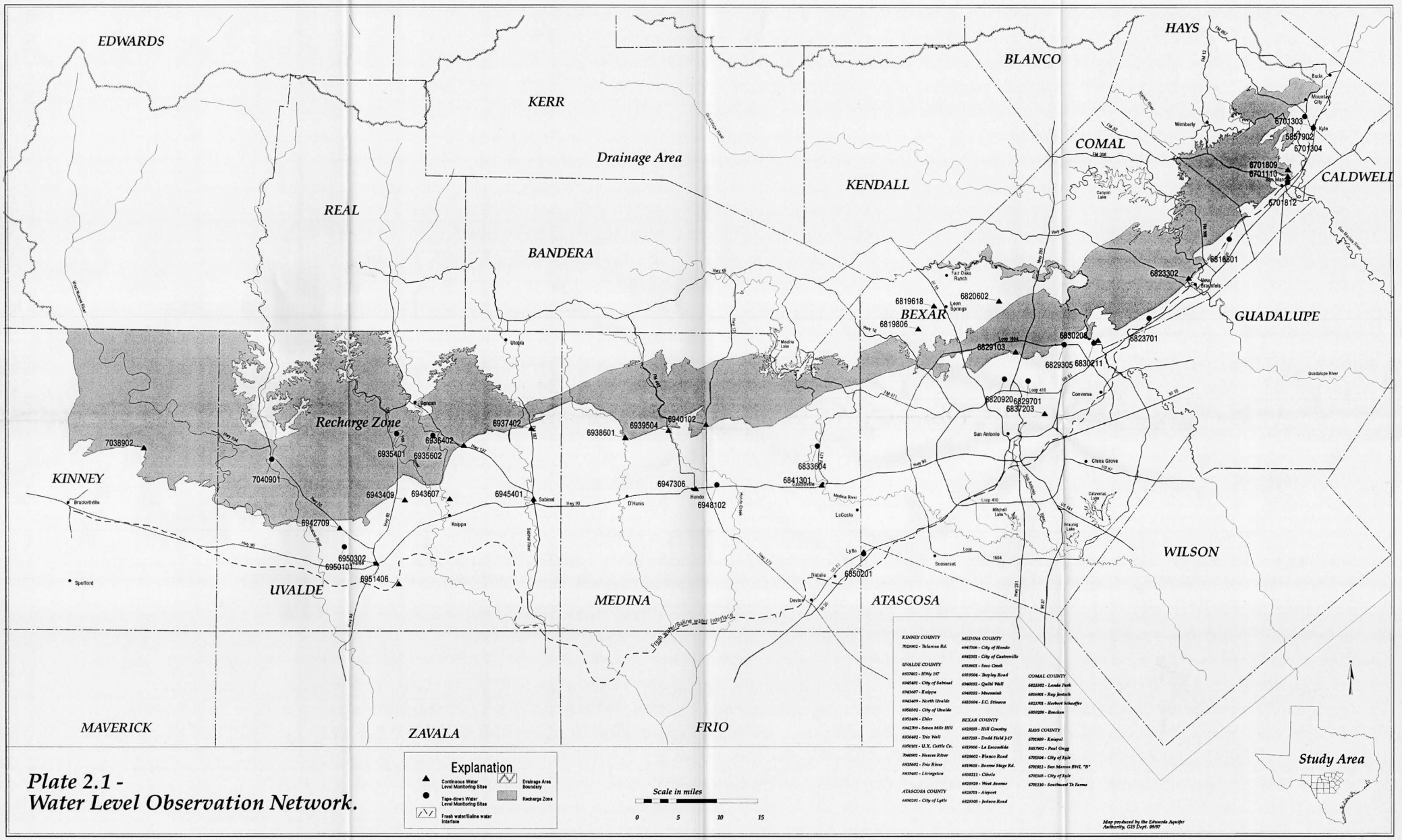

Plate 2.1 -
Water Level Observation Network.

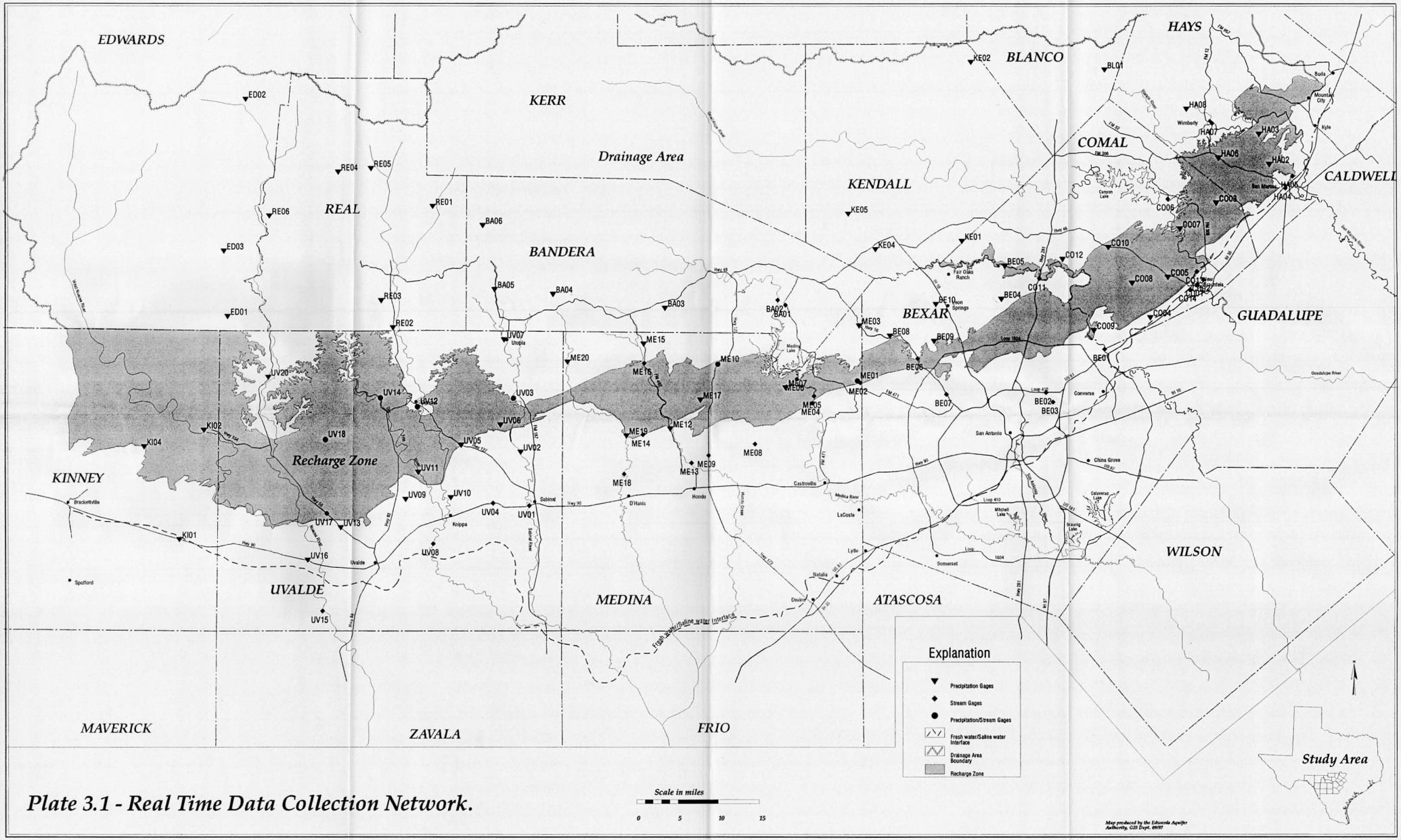

Plate 3.1 - Real Time Data Collection Network.

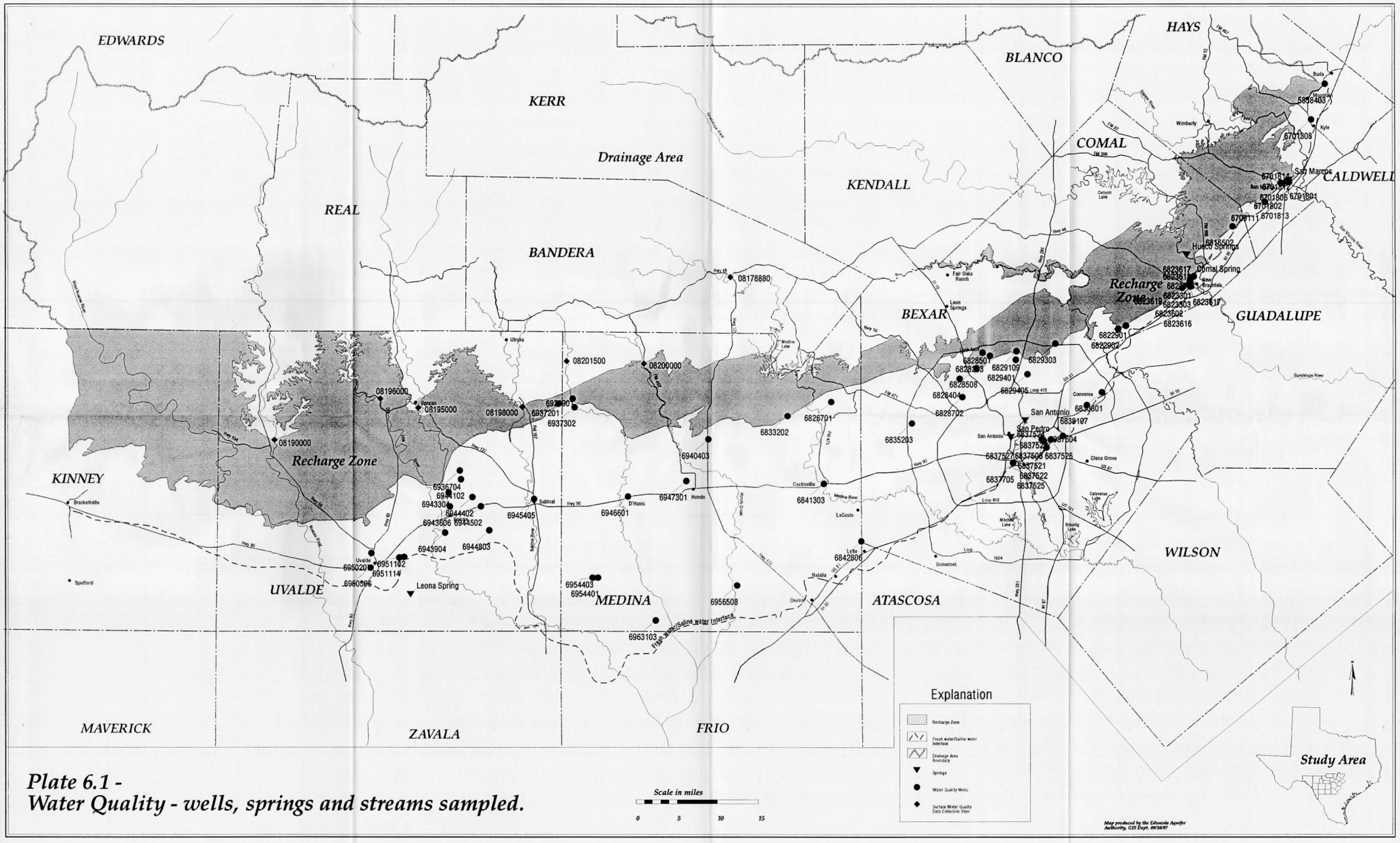

Plate 6.1 -
Water Quality - wells, springs and streams sampled.