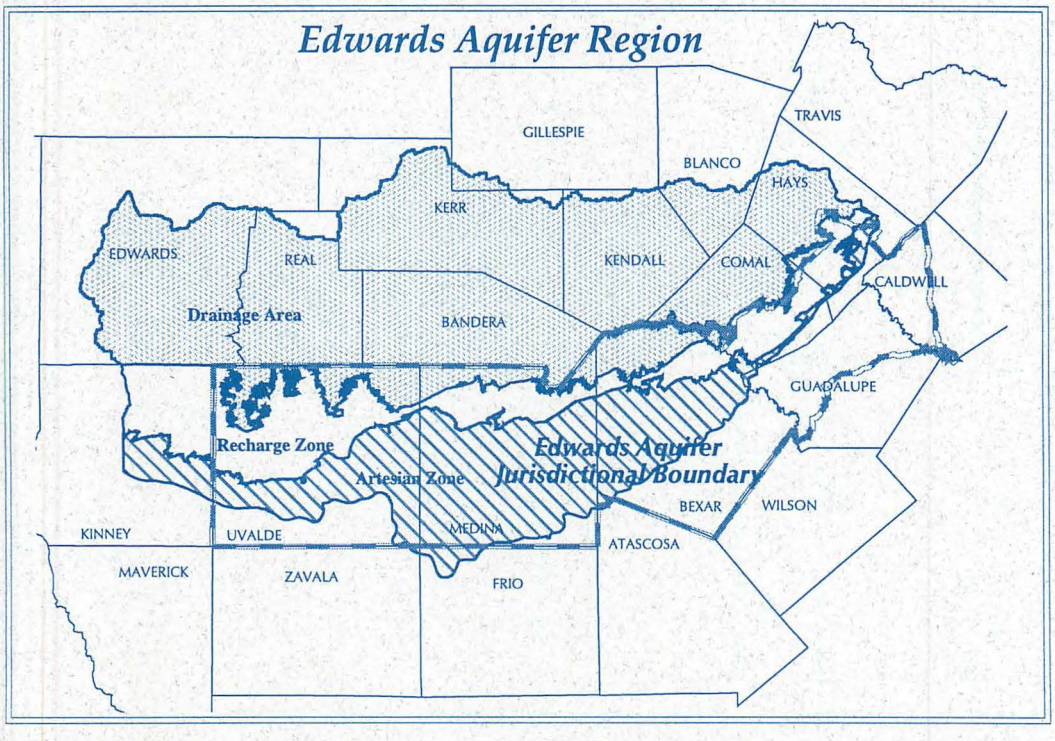
EDWARDS AQUIFER
AUTHORITY

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

Edwards Aquifer Hydrogeologic Report for 1997



Report 98-02

Prepared by: The Water Resources Team

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AUTHORITY

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EDWARDS AQUIFER HYDROGEOLOGIC REPORT FOR 1997

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1.0 INTRODUCTION

The Edwards Aquifer is one of the most permeable and productive limestone aquifers in the United States. The aquifer extends approximately 180 miles 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**). The aquifer provides potable water to approximate one and a half (1.5) million people in the region.

The Edwards Aquifer Authority (the Authority) encompasses all or part of an eight-county area of South-Central Texas, including Uvalde, Medina, Bexar, Atascosa, Comal, Hays, Guadalupe, Caldwell and counties. The Authority was created by the Texas Legislature in 1993 to replace the Edwards Underground Water District (EUWD) and to manage, preserve and protect the Edwards Aquifer. The Authority is governed by a 17-member board of directors. with voting members elected to represent the 15 districts across the region, and two non-voting members appointed by other entities. Directors represent agricultural, municipal, spring and downstream user groups. The Legislature also created a South Central Texas Water Advisory Committee to interact with the Authority when issues related to downstream water rights are addressed.

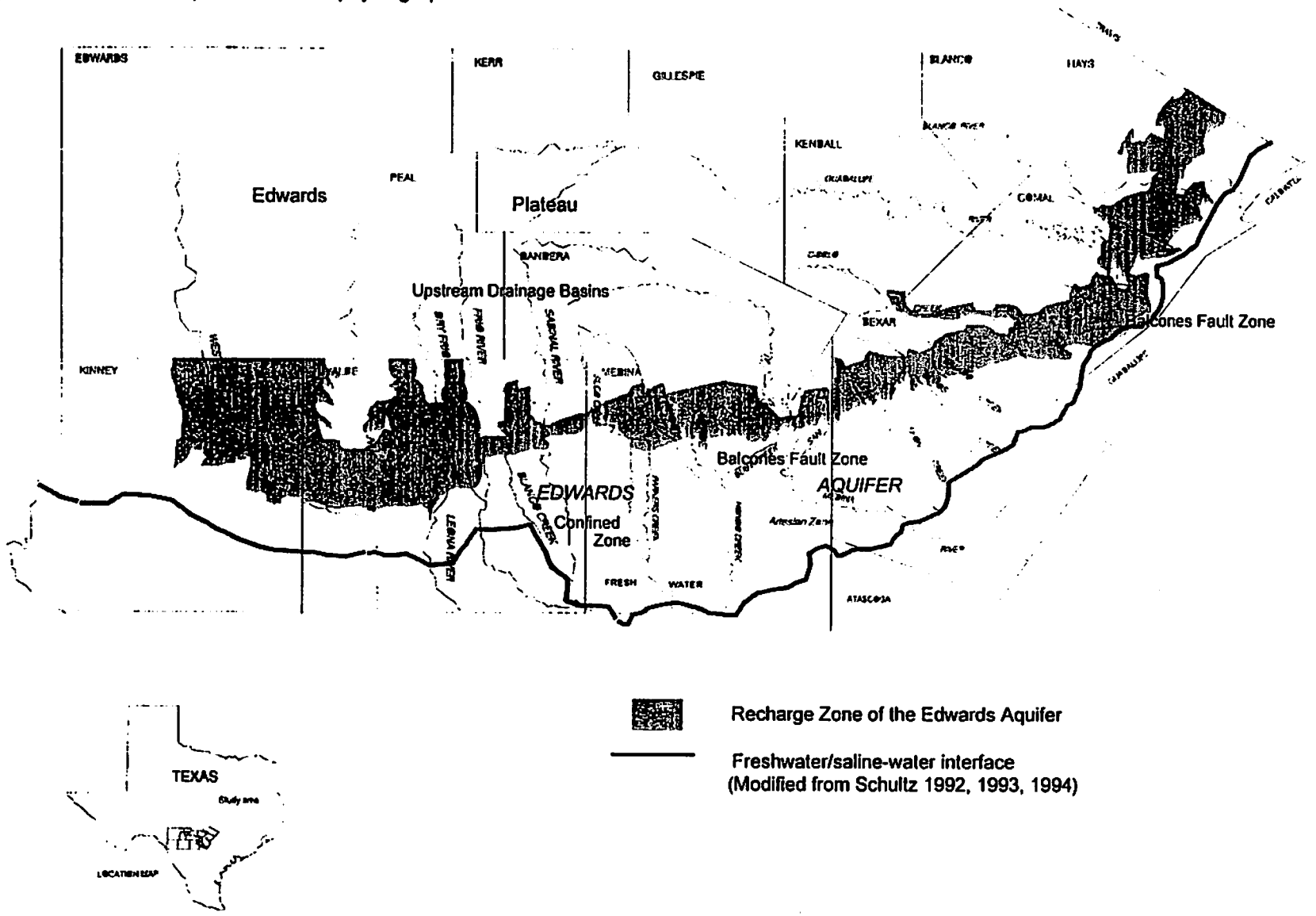
The Legislature mandated the Authority take all necessary measures to effectively control the resource to protect domestic and municipal water supplies, the operation of existing agriculture and industries, terrestrial and aquatic life, and the economic development of the region. To accomplish these goals, the Authority is vested with all of the powers, rights and privileges necessary to manage, conserve, preserve and protect the Edwards Aquifer, and to increase the recharge of, and prevent the waste or pollution of water in, the aquifer.

This report addresses the San Antonio Region of the Edwards Aquifer. It presents quantitative and qualitative data collected in 1997, as well as an historical perspective by providing annual data for the period of record (1934-1997). Information concerning water levels and water quality are provided in this report.

ACKNOWLEDGMENTS

Thanks are extended to municipalities, agencies (federal, state, and local), and other well owners who participated in this study by granting access to their wells. land. and records. Particular thanks are extended to the members of the South-Central Texas study unit of the U.S. Geological Survey - National Water Quality Assessment (USGS-NAWQA) for their efforts in the collection and analysis of some of the data presented in this report. Also, thanks are extended to the U.S. Geological Survey - Water Resources Division (San Antonio Subdistrict) for their superlative work in compiling and calculating the recharge to and discharge from the Edwards Aquifer.

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



2.0 WATER LEVELS

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. **Plate 2.1** shows the locations of the Authority's observation well network within the Edwards Aquifer region. 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. All water-level measurements are made in feet above mean sea level (MSL).

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 1997 as part of the Authority's water-level data collection program. 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 is recorded on digital storage cards and then downloaded during a monthly site inspection, or by modem to the Authority's office. To augment the water-level observation network, Authority staff measures 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 is also forwarded to federal, state and regional agencies.

The Authority, and its predecessor the EUWD, have 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 helps in the management of this regional water resource.

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 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 records of high and low water levels measured in five selected Edwards Aquifer observation wells.

In 1997, total recharge was greater than total discharge, demonstrated by generally increasing water levels from January to June, and only minimal decrease in the water levels between July and December **(Appendix A: Tables A-1 – A-6)**. The net change in water levels at the Bexar County index well between January and June was an increase of 29.2 feet. The lowest measured level was 648.7 feet above MSL in February, and the highest level of 677.9 feet above MSL was recorded in June **(Appendix A: Table A-5)**. The remaining months of the year indicated a slight

decrease of 8.8 feet, which is the difference between the recorded high of 677.9 feet above MSL in June less December's lowest level of 669.1 feet above MSL. The water level measured at the Bexar County index was 672.6 feet above MSL at the end of the year **(Figure 2.1)**.

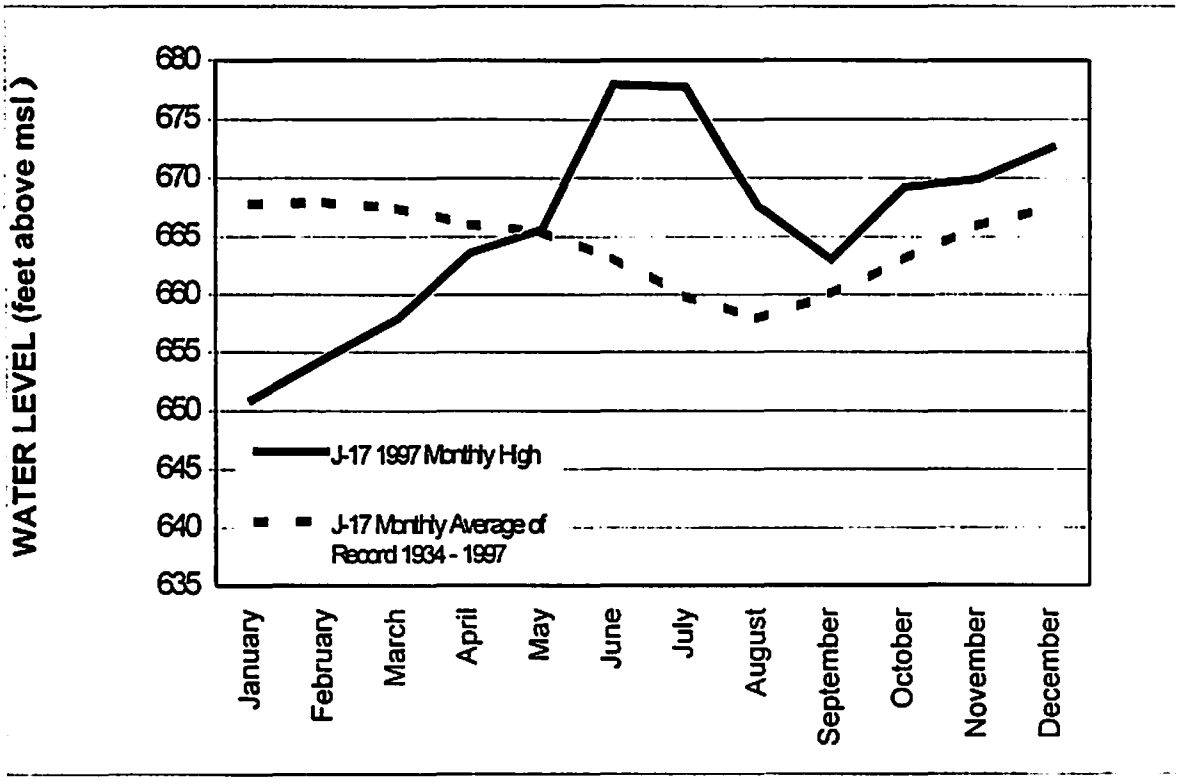
Overall the water levels in the Edwards Aquifer increased during 1997. The water levels in 1997 surpassed the levels recorded in 1996 **(Table 2.1)**. The average annual water level (662.8 feet above MSL) at the Bexar County index well was lower than the average historic level of 664.3 feet above MSL. The Edwards Aquifer water levels were above the trigger level for Stage I (i.e.. above 650 feet) of the Critical Period Management Rules in the J-17 (AY-68-37-203) index well during most of 1997. The Critical Period Management Rules were implemented after mid February 1997 when the water levels in J-17 rose above 650 feet (Rick Illgner, personal communication. 1998). **Figure 2.1** compares the average water level for the period of record and maximum water levels for the year 1997. **Tables A-1** through **A-6** in **Appendix A** show 1997 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, 1934-1997 (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-67-01-304	
	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	551.3
1997	882.3	868.2	700.5	672.7	677.9	648.7	626.4	623.6	575.8	559.0
Average	High	Low	High	Low	High	Low	High	Low	High	Low
	872.1	863.1	700.8	672.2	675.1	652.1	626.5	623.4	583.0	567.3
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, 1997.

Figure 2.1 Water-level comparison between the monthly average of record (1934-1997) and the monthly highs for 1997 at the Bexar County index well, AY-68-37-203.



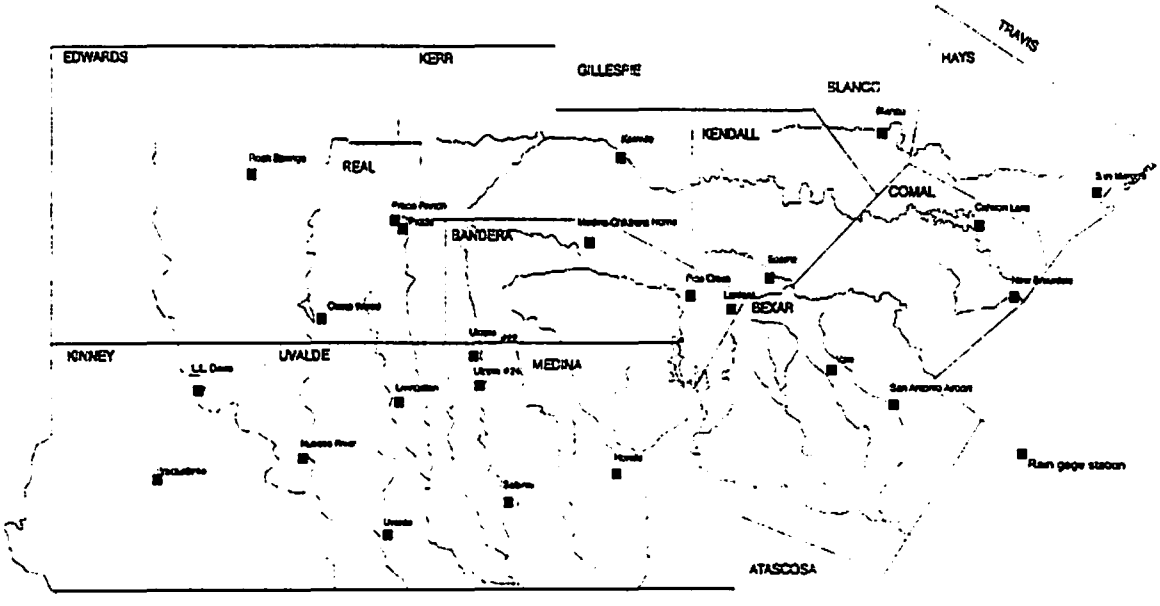
3.0 PRECIPITATION

Precipitation is the pri. sourc :charge to the Edwards Aquifer. Water levels monitored by the Authority's r rk of c ation wells across the Artesian Zone have risen within hours of a heavy rain vent o Edwards Aquifer Recharge Zone (EARZ) or associated upstream drainage ba n the c Texas Hill Country.

Annual precipitation in Edwar uifer region is monitored by the Authority to determine the volume of ground recha the aquifer. Precipitation data is gathered from Authority rain-gage stations, nal O and Atmospheric Administration (NOAA) weather stations, and the USG n-gage ons located across the EARZ and upstream drainage basins. **Figure 3.1** is a showi locations of the precipitation gaging stations the Authority uses to record area all.

A Real Time Data Net , consi of 68 rain-gage observation sites, reports precipitation data at six-minute in als to th thority office. In addition, daily precipitation data is forwarded every month to t Authority m seven rain-gage observation sites located on the EARZ. This information is m d wi data from numerous weather and rain-gage stations maintained by NOAA and . USGS. T precip tion information is used to calculate recharge and to monitor any pre pitation trend hat y affect recharge to the Edwards Aquifer. **Plate 3.1** indicates the locations of all Real Time ata Network sites.

Figure 3.1 Sites in the regional rain-gage network utilized by th dwards Aquifer Authority to monitor precipitation.



Precipitation data for San Antonio has 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 1997 was significantly above normal levels (13%) in the Edwards Aquifer region. Average precipitation in San Antonio for the period between 1934 and 1997 is 30.04 inches. In 1997, total precipitation, measured at the San Antonio International Airport, was 33.94 inches. Recovery of Edwards Aquifer water levels from the low levels observed in 1996 can be directly attributed to increased precipitation within the Edwards Aquifer recharge and catchment zones. **Figure 3.2** demonstrates a hydrograph of precipitation for San Antonio from 1934 to 1997. **Table 3.1** shows annual precipitation for selected rain gages in the region. **Table 3.2** shows monthly measurements for 1997 at selected rain-gage stations across the region.

Figure 3.2 Annual precipitation, and average precipitation for San Antonio, 1934-1997.

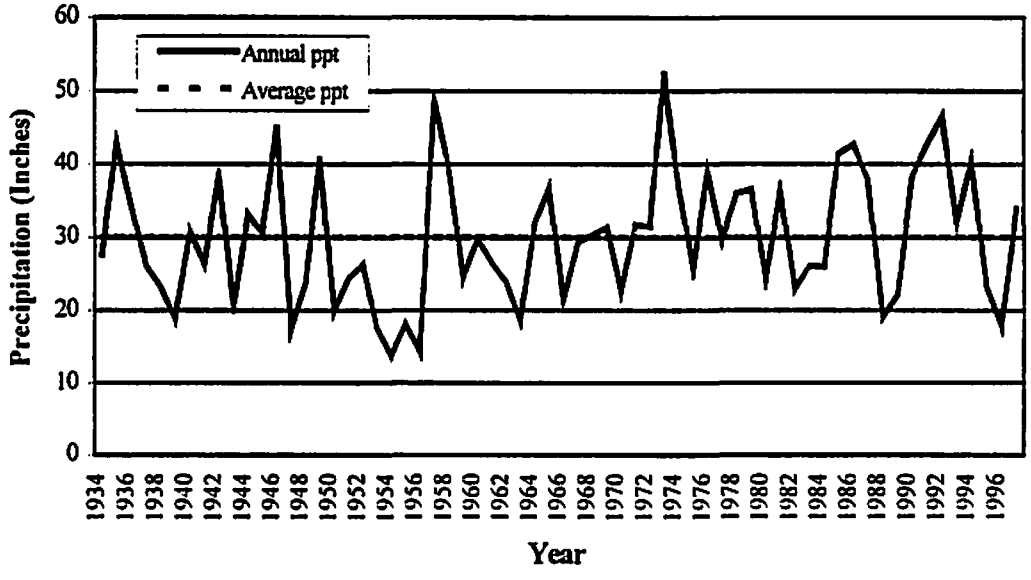


Table 3.1 Annual precipitation for selected rain-gages in the Edwards Aquifer region, 1934-1997 (measured in inches).

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/24.01
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
1997	---	27.77	35.74	37.54	33.94	---	41.65	43.56
Years of Record	95	94	79	93	113	93	98	94
Yearly Average	21.67	23.69	24.42	28.40	30.04	33.71	32.97	34.09

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 (1934-1997).

Table 3.2 Monthly precipitation data from Edwards Aquifer Authority rain-gage network and National Oceanic and Atmospheric Administration precipitation-gaging stations, 1997 (measured in inches).

Gage	County	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total
Vanderpool	Bandera	0.73	3.09	4.05	4.05	5.59	9.18	0.09	1.16	1.15	3.95	0.99	1.83	35.86
Children's Home	Bandera	0.75	4.03	3.10	5.15	4.85	8.60	0.00	0.75	0.15	5.75	0.87	2.35	36.35
New Braunfels	Comal	0.88	3.93	1.41m	6.13	4.13	9.49m	0.64	0.68	2.49	4.59	2.40	4.88	41.65
San Marcos	Hays	0.81	2.80	1.89	7.59	4.60	11.45	0.83	2.08	1.43	3.77	2.94	3.37	43.63
Uvalde	Uvalde	0.83	1.17	2.56	4.08	3.82	6.10	0.85	0.38	1.40	4.73	1.10	0.75	27.77
Kerrville	Kerr	0.86	4.62	2.87	5.80	4.57	9.92	0.49	0.27	0.38	3.67	1.98	2.27	37.70
Hondo	Medina	1.40	2.84	3.84	5.02	3.89	11.53	0.31	0.17	1.37	4.09	1.71	1.37	37.54
Prade Ranch	Real	0.55	2.17	2.15	2.40	m	m	m	m	m	m	m	m	7.27m
Livingston	Uvalde	0.55	1.40	3.20	5.50	2.40	5.85	0.60	0.40	0.10	4.35	1.12	0.47	25.94
Utopia 22	Uvalde	0.75	2.57	2.95	8.60	3.35	10.80	1.10	0.00	1.30	5.02	0.92	1.02	38.38
Utopia 24	Uvalde	0.75	2.32	3.10	5.92	5.20	13.15	0.80	0.20	0.85	2.75	1.05	0.72	37.72
Sabinal	Uvalde	0.87	2.14	3.70	3.77	4.79	12.39	0.10	0.24	1.03	4.38	1.39	0.94	35.74

"m" indicates missing or incomplete data for the month.
Data source: Edwards Aquifer Authority and US Department of Commerce, 1997.

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 1997, based on USGS calculations. The USGS estimates annual recharge for the period of record, 1934 to 1997, ranges from 43,700 acre-feet at the height of the drought in 1956 to 2,486,000 acre-feet in 1992. In 1997, estimated recharge was 1,135,000 acre-feet. The average annual recharge from 1934 to 1997 was 676,000 acre-feet. However, since 1987, the 10-year average annual recharge is estimated to be approximately 953,200 acre-feet. **Figure 4.2** depicts 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 1997.

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. Higher than normal rainfall conditions in 1997 resulted in the increase of recharge to the Edwards Aquifer.

The Authority operates four recharge dams across the EARZ. The locations of the recharge structures are shown in **Figure 4.1**. In, 1997, gages were operational at only one of the recharge structures, Parker Creek Dam. **Table 4.3** shows the 1997 monthly recharge to the Edwards Aquifer from the Parker Creek recharge structure. This data, which is provisional, subject to review by the USGS, indicates Parker Creek Dam contributed very minimal amounts of recharge to the aquifer in 1997. **Table 4.4** shows the annual historical recharge recorded for each site since construction. 1997 recharge data for Parker Creek Dam, as with monthly recharge data, is provisional, and 1997 recharge calculations for Seco Creek Dam are not available (David Brown, written communication).

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

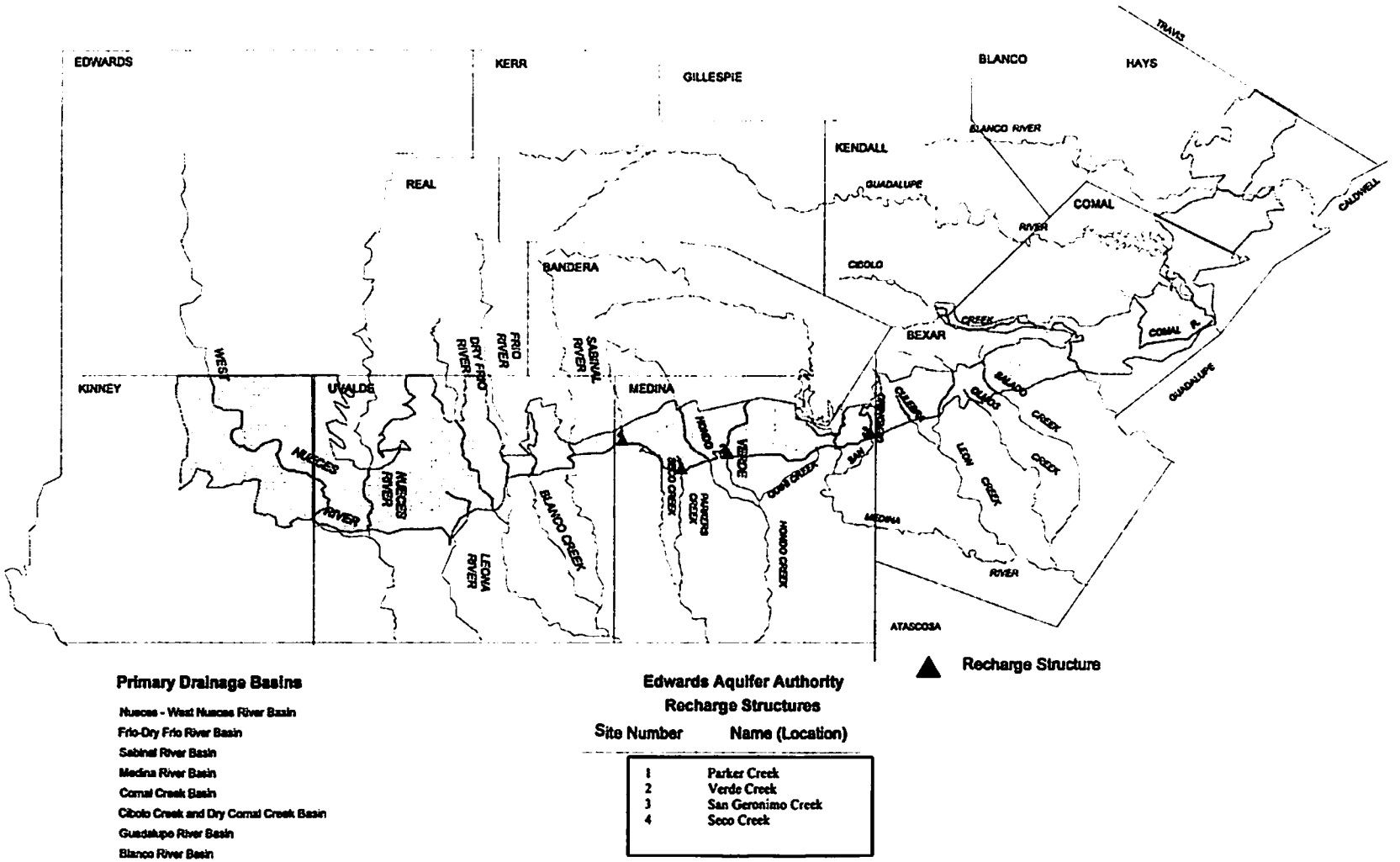


Table 4.2 Estimated annual groundwater recharge to the Edwards Aquifer by river basin, 1934-1997 (measured in thousands of acre-feet).

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*
1989	52.6	52.6	8.4	13.5	46.9	4.6	12.3	23.6	214.4
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
1997	176.9	209.1	57	208.4	63.3	193.4	144.2	82.3	1134.6
For the period of record 1934-1997:									
Average	116.3	133.1	41.7	107.1	61.1	70.6	103.9	41.9	676.0
Median	94.5	115.9	30.9	78.4	58.6	49.9	77.4	34.1	547.1
For the period of record 1988-1997:									
Average	172.2	211.2	54.6	143.7	62.2	74.1	86.5	61.5	866.3
Median	127.3	149.6	32.2	61.6	61.4	36.1	63.7	37.2	534.7

Data source: USGS, 1998.
Total* might not be equal sum of basin values due to rounding.

Figure 4.2 Annual recharge and 10-year floating average recharge for the San Antonio area of the Edwards Aquifer (1934-1997).

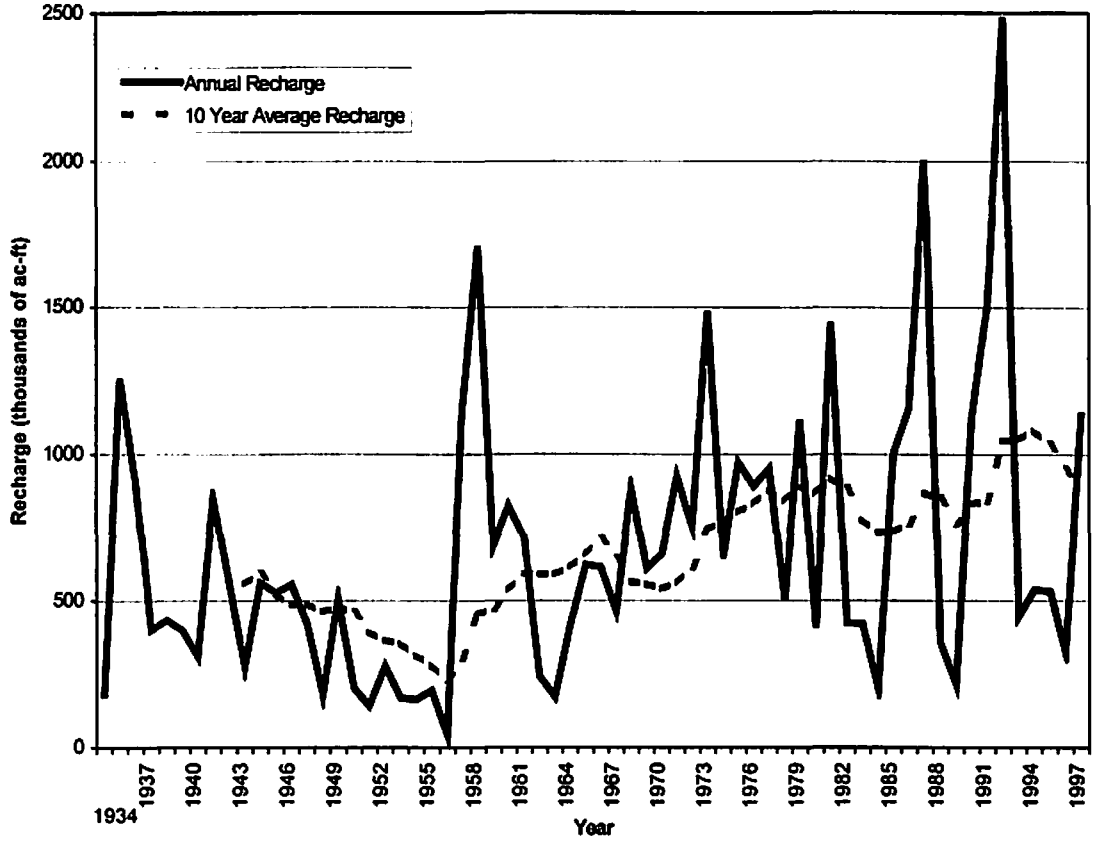


Table 4.3 Monthly groundwater recharge at Parker Creek recharge structure, 1997 (measured in acre-feet).

Month	Parker Creek Dam Adjudication No. 3192
January	0
February	0
March	0
April	36.2
May	118.6
June	2786.3
July	0
August	0
September	0
October	0
November	0
December	0
Total	2941.1

Data source: USGS, 1997, provisional data.

The 1997 recharge calculations shown in **Table 4.4** for Verde Creek and San Geronimo Creek dams were determined by a linear regression analysis, using the "least squares" method. For each area, a comparison of rainfall data in the relevant drainage basin (obtained from the National Weather Service) to historical recharge data for the dam was used as data input. The resulting data was used to generate a linear regression equation. This equation was used to predict the amount of recharge at each of the two recharge structures for a given rainfall within the basin. A comparison of the resulting data to historical recharge indicates the regression results are reasonable (Gregory James, written communication).

The average annual recharge attributed to Parker, Verde and San Geronimo recharge dams reflects the date of construction through 1997; the average for Seco Creek Dam reflects the year of constructions through 1996. The average historical recharge attributed by the combined structures is 3,100 acre-feet. The average annual recharge attributed by the Parker, Verde and San Geronimo dams during 1997 is approximately 1,744 acre-feet.

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
1997	2,941a	907b	1,383b	---	5,231
Total	**13,333**	**15,154**	**11,967**	**33,944**	**74,398**
Average	556	758	630	2,263	3,100
Median	160	250	91	479	794

Data source: USGS and Edwards Aquifer Authority, 1997.
"a" Provisional data.
"b" Determined by linear regression analysis.
"---" indicates no data available.

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 as springflow or through 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 then making the necessary corrections from these values. **Figure 5.1** is the location map of the major springs of the Edwards Aquifer. The groundwater discharge resulting from pumping is calculated by tabulating reported water-use data from public supply, irrigation, agricultural, industrial, commercial and domestic wells.

Estimates of annual groundwater discharge from springflow and pumping for the San Antonio area of the Edwards Aquifer are available from 1934 to 1997 (**Table 5.1**). Annual groundwater discharges range from the calculated low of 388,100 acre-feet in 1955 to the calculated high of 1,100,000 acre-feet in 1992. In 1997, total groundwater discharge from the Edwards Aquifer from wells (excluding irrigation discharge from Bexar, Medina, and Uvalde counties, because important variables {i.e., factors and data} used in the USGS calculations are no longer available) and springs was estimated at 684,700 acre-feet.

Springflow from 1934 to 1997 has varied from a low of 69,800 acre-feet in 1956 to a high of 802,800 acre-feet in 1992 (**Table 5.1**). **Table 5.2** shows the monthly estimated discharge in 1997 for six primary Edwards Aquifer springs. Spring discharge from the Edwards Aquifer for 1997 was calculated at 384,000 acre-feet. Spring discharge accounted for 56 percent of total discharge from the Edwards Aquifer in 1997 (**Tables 5.1 and 5.2**). It should be noted, however, that the inclusion of irrigation discharge into the equation would decrease the percentage of spring discharge to total discharge.

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. **Figure 5.2** is a graph comparing groundwater withdrawal to springflow. The lowest estimated annual aquifer pumping level was 101,900 acre-feet, recorded in 1934. Since 1934, pumping from the Edwards Aquifer has increased more than 400 percent. Average annual well production is estimated to be 294,900 acre-feet per year for the period of record from 1934 to 1997, while the estimated floating 10-year average for pumping from 1988 through 1997 is 436,100 acre-feet (**Table 5.1**). Reported groundwater pumping accounted for 300,700 acre-feet of water discharged from the Edwards Aquifer in 1997.

Table 5.3 shows the 1997 discharge data by use for six of the eight counties in the region. The discharge estimates were compiled from pumpage data for public water supply, industry and the military, reported to the Texas Water Development Board, the Authority, and USGS; and pumpage from domestic supply, stock, and miscellaneous use were estimated by the USGS (USGS, 1998). **Table 5.4** shows annual estimated Edwards Aquifer groundwater discharge by use from 1955 to 1997.

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

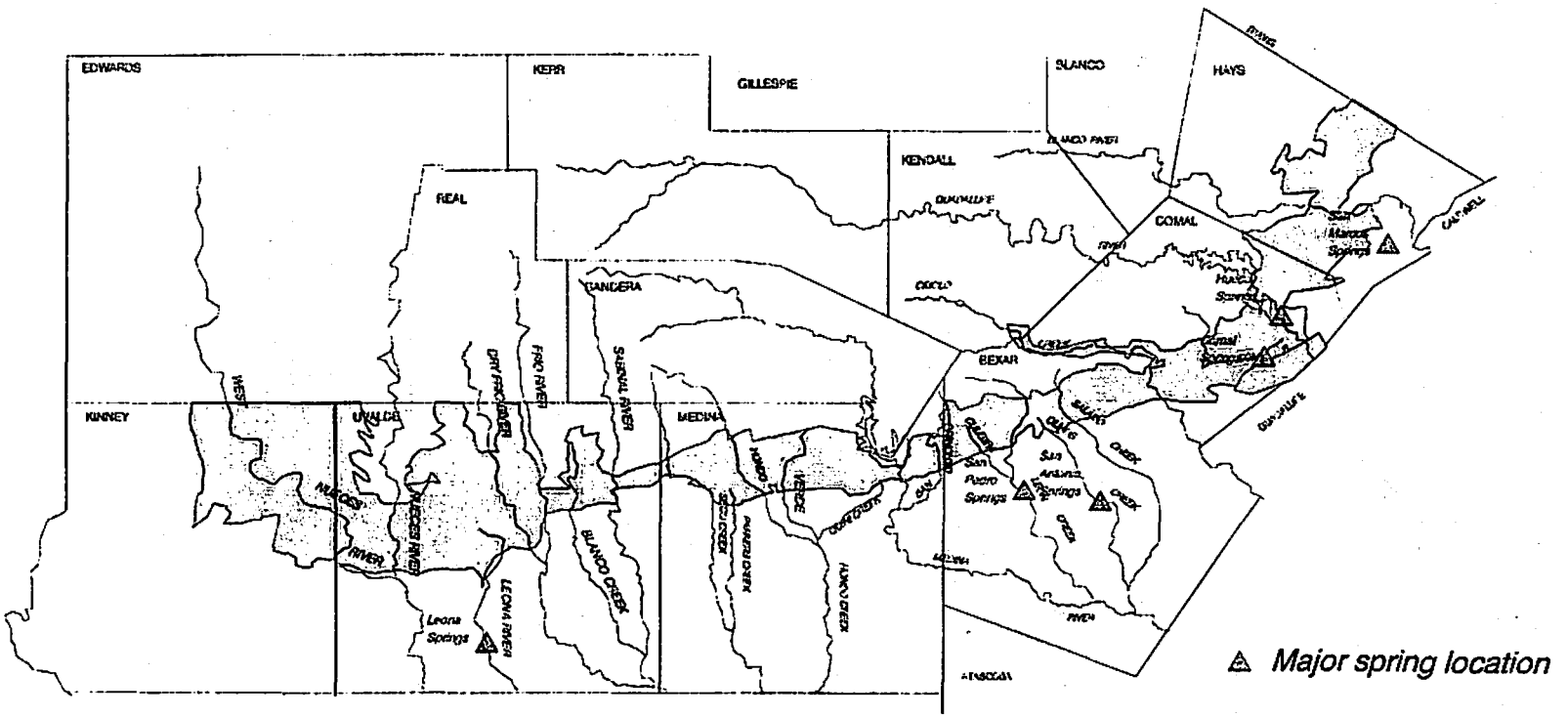


Table 5.1 Annual estimated groundwater discharge data by county for the Edwards Aquifer, 1934-1997 (measured in thousands of acre-feet).

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
1997	77.0	31.4	260.2	243.3	149.2	761.1	377.1	383.9
For period of record 1934-1997:								
Average	69.9	18.7	235.2	218.3	117.8	659.9	296.1	363.8
Median	58.8	10.8	218.8	230.5	114.2	637.2	272.2	372.6
For period of record 1988-1997 (10 years):								
Average	107.3	44.9	307.4	243.8	133.2	836.6	443.7	392.9
Median	101.5	38.2	301.7	235.8	122.4	778.6	430.3	365.5

Differences may occur due to rounding procedures.

*In 1995 the USGS has revised the method of calculating domestic/livestock pumping, which significantly decreased the estimate for 1996.

Data source: USGS and Edwards Aquifer Authority, 1998.

Table 5.2 Estimated spring discharge from the Edwards Aquifer, 1997 (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.	12,030	6,090	194	0	0	849	19,160
Feb.	11,310	5,440	728	0	0	802	18,280
March	13,750	6,990	2,000	0	58	1,110	23,910
April	14,970	8,330	2,880	0	118	1,420	27,720
May	15,820	11,160	3,750	0	178	1,570	32,480
June	16,930	16,300	4,170	423	291	1,660	39,770
July	18,700	18,860	4,660	930	389	1,800	45,340
Aug.	17,410	16,400	4,540	278	216	1,920	40,760
Sept.	16,010	13,500	3,850	0	147	2,000	35,510
Oct.	16,970	12,190	3,280	0	198	2,290	34,930
Nov.	16,860	10,670	2,410	0	257	2,400	32,600
Dec.	18,190	10,220	2,180	33	278	2,550	33,450
Total	**189,000**	**136,200**	**34,640**	**1,660**	**2,130**	**20,380**	**384,000**

Differences may occur due to rounding procedures.
Data source: USGS, 1998.

The Authority estimated discharge from the Edwards Aquifer for irrigation use in 1997. In previous years, the USGS determined the total amount of irrigated acreage from county tax rolls, which have remained relatively constant over recent years. County soil and water conservation districts provided estimates of irrigation "duties" for selected crop types. The USGS multiplied these duties by amounts of irrigated acreage by crop type as provided by the U.S. Department of Agriculture (USDA), thereby determining an estimate of irrigation uses from the Edwards Aquifer. USDA no longer provides this data, making this method of estimation impossible to use.

The Authority is, for the first time, receiving reported irrigation data from permitted Edwards Aquifer users. Reports collected from irrigation users indicate the amount of water withdrawn and applied to crops. The 1997 irrigation discharge values were determined by selecting samples from the questionnaire responses that were considered representative of typical irrigation use. Irrigation reports that appeared to have been compiled based on regulatory requirements were discounted and removed from the sample. The samples used represent 56 percent of the total verified irrigated acreage for the Edwards Aquifer region. This percentage was separated by county and extrapolated to the total verified acreage for each county, along with the accompanying application rates for that area. These values were then totaled for the region.

The irrigation discharge estimate is based on usage data that is reported but not verified. Irrigation users report their total based on a variety of methods including metering, fuel use, electrical power use, measurement of application on crop, and pumping time estimates. Each of these methods has inherent errors. In future years, the irrigation discharge value will be based on metered use and will increase in accuracy.

Figure 5.2 Groundwater pumping compared to springflow in the Edwards Aquifer, 1934-1997 (measured in thousands of acre-feet).

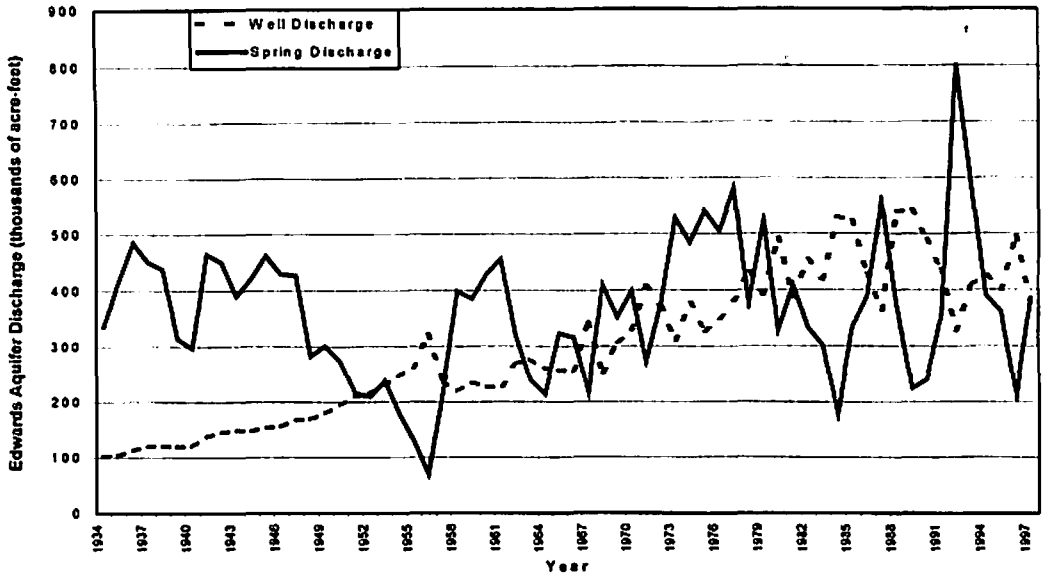


Table 5.3 Total groundwater discharge from the Edwards Aquifer, 1997 (measured in thousands of acre-feet).

County	Irrigation	Municipal /Military	Domestic /Stock	Industrial	Total Wells	Springs	Total Well & Springs
Bexar	4.9 a,b	225.1	8.1	18.3	256.4	3.8	260.2
Comal	0.3 b	4.1	0.3	15.0	19.7	223.6	243.3
Hays	0.1 b	11.6	0.7	0.6	13.0	136.2	149.2
Medina	24.4 b	6.2	0.8	0.0	31.4	0.0	31.4
Uvalde	47.1 b	4.9	2.1	0.6	54.7	20.4	75.1
Kinney	0.6 c	1.0	0.3	0.0	1.9	0.0	1.9
Total	**77.4**	**253.0**	**12.3**	**34.4**	**377.1**	**384.0**	**761.1**

Differences may occur due to rounding procedures.
Data source: USGS and Edwards Aquifer Authority, 1998.
"a" Includes Atascosa County.
"b" Estimated from survey of Edwards Aquifer irrigators.
"c" Estimated by USGS.

Table 5.4 Annual estimated Edwards Aquifer groundwater discharge by use, 1955-1997 (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
1997	77.4 a,b	253.0	12.3	34.4	383.9
Average 1955-97	108.1	200.1	32.6	22.9	367.6
Median 1955-97	101.8	196.2	33.4	22.2	369.7
Average 1988-97	120.6	257.2	31.2	34.8	392.9
Median 1988-97	100.1	254.0	36.4	35.2	365.5

"a" Includes Atascosa County, and "b" estimated from survey of Edwards Aquifer irrigators.
Differences may occur due to rounding procedures.
*In 1995 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, 1998.

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 has maintained a network of groundwater 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 1997, the Authority in cooperation with the USGS, collected water-quality samples from 46 wells, 6 springs, and 8 streams. The locations of these sites 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, conductivity, and alkalinity. The laboratory analyses include common major ions, minor elements (metals, including heavy metals), nutrients, pesticides, herbicides, volatile organic compounds and other selected analytes. Constituents and their typical concentrations in groundwater are listed in detail in **Table 6.1**.

In 1997, 46 wells in the Edwards Aquifer were sampled and analyzed for the occurrence of minor elements. Laboratory analyses indicated several wells contained minor element concentrations slightly above the minimum analytical detection limit (MDL) for these constituents. However, concentrations slightly above MDLs are not considered to be reproducible quantitative values and must be viewed with a degree of caution. 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**.

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 1997 consisted of 8 streams and 6 springs distributed in all five counties. The samples showed no detectable levels of any volatile organic compounds.

In 1997, 8 streams and 6 springs 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 (CO_3) (mg/L)	--	0
Sulfate (SO_4) (mg/L)	250*	10-30
Chloride (Cl) (mg/L)	250*	10-30
Fluoride (F) (mg/L)	4	0.1-0.5
Silica (SiO_2) (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 Groundwater quality standards(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: EPA 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: EPA maximum contaminant levels, 40 CFR , Part 141, 1995.

Overall, results of the 1997 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 dissolved 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 initialized 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 transects the freshwater/saline-water interface to detect changes in water quality as the 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 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 areas (Poteet and others, 1992). All transect wells have maintained relatively constant values of water quality with no significant changes.

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

Miscellaneous Water-Quality Constituents and Standards

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 has been presented in various bulletins and reports, with detectable concentrations of certain contaminants noted. A discussion of the significance and potential health effects of several of these contaminants 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. The EPA also classifies it 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 Texas Natural Resources Conservation Commission (TNRCC). The MDL for lead in water-quality sample analysis is 0.01 µg/L, and the 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 1997, 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 may be detected in the vicinity of landfills and manufacturing sites that produced these items. The MCL for mercury is 2 µg/L. The MDL 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 1997 sampling program.

Volatile Organic Compounds (VOCs) – At least five VOCs 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. MDLs 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. The Authority, as well as other local, state and federal agencies have investigated specific sites of former industries and landfills in Uvalde and Bexar counties. No reported instances of VOC contamination were investigated by the Authority during 1997.

Secondary Drinking Water Standards – These standards are non-enforceable 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 affect 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: EPA, 40 CFR, Part 143, 1995.

The Authority 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 excellent water quality of the aquifer through investigating groundwater contamination, and identifying and analyzing anomalous data from the Authority's aquifer-wide sampling program.

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 eight major stream basins that flow across and contribute significant groundwater recharge to the Edwards Aquifer within the EARZ in the San Antonio Region. These include from west to east, the Nueces River, Dry Frio River, Frio River, Sabinal River, Seco Creek, Hondo Creek, Medina River, and Blanco 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 to land use changes 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 1997 (**Appendix B**) indicate no evidence of detectable concentrations of pesticides, herbicides, volatile organic compounds or other constituents or parameters in excess of typical standards.

7.0 SUMMARY

The average estimated annual groundwater recharge to the Edwards Aquifer in the San Antonio area from 1934 through 1997 was 676,000 acre-feet. Recharge in 1997 was 1,135,000 acre-feet, which was well above 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 (excluding irrigation discharge for Bexar, Medina, and Uvalde counties) and springs in 1997 was 684,700 acre-feet. The lowest annual discharge through wells and springs was 388,800 acre-feet, which occurred in 1955. Water-level data during 1997 reflected a general increase in water recharging the aquifer and a decrease in pumping during the year.

Results of the Authority's 1997 water-quality monitoring program illustrate the continued excellent quality of water in the Edwards Aquifer. In 1997, 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 1997 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 acre to a depth of one foot, 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, rod-like, or spiral and threadlike in shape, often clumped in colonies. Some bacteria are pathogenic (causing disease), while others perform an essential role in nature in the recycling of materials (measured in colonies/100 ml).

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. Expressed as the algebraic reciprocal of electrical resistance (measured in microSiemens per centimeter (µS/cm) at ambient temperature). Generally, in water the greater the total dissolved solids content, the greater the value of conductivity. See also Specific conductance.

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 — An area bounded by a divide and occupied by a drainage system. It 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 total dissolved solids (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 groundwater moves away in both directions.
Micrograms per liter (µg/L)	A unit for expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. 1,000 micrograms per liter are equal to 1 milligram per liter.
Milligrams per liter (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 are 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 an aqueous solution to conduct an electrical current. Specific conductance is the given value of conductivity adjusted to a standard temperature of 25°C. Expressed in microsiemens per centimeter (µS/cm). See also Conductivity.
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 positioned in a site 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 land surface within 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.

9.0 REFERENCES

Bader, R.W., Walthour, S.D., and Waugh, J.R., 1993, Edwards Aquifer hydrogeologic status report for 1992: Edwards Underground Water District Report 93-05, 71 p.

Edwards Aquifer Authority, 1996 Open Data Files.

Edwards Underground Water District, 1995, Division of Field Operations Open Data Files.

Pavilicek, D.J., Small, T.A., and Rettmann, P.L., 1987, Hydrogeologic data from a study of the freshwater zone/saline-water zone interface in the Edwards Aquifer, San Antonio Region, Texas: U.S. Geological Survey Open-File Report 87-389, 108 p.

Poteet, Diane, Collier, Hughbert, and Maclay, R.W., 1992, Investigation of the fresh/saline-water interface in the Edwards Aquifer in New Braunfels and San Marcos, Texas: San Antonio, Tex., Edwards Underground Water District Report 92-02 [variously paged].

Puente, Celso, 1978, Method of estimating natural recharge to the Edwards Aquifer in the San Antonio area, Texas: U.S. Geological Survey Water-Resources Investigations Report 78-10, 38 p.

Reeves, R.D., 1971 Results of test drilling at the San Marcos Fish Hatchery, Texas: U.S. Geological Survey Open-File Report, 11 p.

Schultz, A.L., 1992, Using geophysical logs in the Edwards Aquifer to estimate water quality along the freshwater/saline-water interface (Uvalde to San Antonio, Texas): Edwards Underground Water District Report 92-03, 47 p.

Schultz, A.L., 1993, Defining the Edwards Aquifer freshwater/saline-water interface with geophysical logs and measured data (San Antonio to Kyle, Texas): Edwards Underground Water District Report 93-06, 81 p.

Schultz, A.L., 1994, 1994 Review and update of the position of the Edwards Aquifer freshwater/saline-water interface from Uvalde to Kyle, Texas: Edwards Underground Water District Report 94-05, 31 p.

United States Department of Commerce, 1970-1994, Climatological data, Texas, annual summaries: National Oceanic and Atmospheric Administration, v 75-97, no. 13.

United States Environmental Protection Agency, 1995, Maximum contaminant levels (subpart of part 141, National primary drinking water regulations): U.S. Code of Federal Regulations, Title 40, parts 100-149.

United States Environmental Protection Agency, 1995, National primary and secondary drinking water regulations; synthetic organic compounds and inorganic chemicals (sections 141.11, 141.12, 141.32, 141.50, 141.51, 141.61, and141.62 of part 143): U.S. Code of Federal Regulations, Title 40 parts 100-149.

United States Environmental Protection Agency, 1995, Secondary maximum contaminant levels (section 141.3 of part 143, National secondary drinking water regulations): U.S. Code of Federal Regulations, Title 40, parts 100-149.

United States Geological Survey, 1996, Basic data collection joint funding agreement with Edwards Aquifer Authority for Fiscal Year 1995-1996: Authority open files.

United States Geological Survey, 1998, Recharge to and discharge from the Edwards Aquifer in the San Antonio Area, Texas, 1997, In cooperation with Edwards Aquifer Authority. 4 p.

Walthour, S.D., Waugh, J.R., and Sutton, C.M., 1994, Edwards Aquifer hydrogeologic report for 1993: Edwards Underground Water District Report 94-04, 178 p.

Walthour, S.D., Waugh, J.R., and O'Connor, Jim, 1995, Edwards Aquifer hydrogeologic report for 1994: Edwards Underground Water District Report 95-07, 124 p.

Waugh, J.R., 1993, South Medina County observation well report: Edwards Underground Water District Report 93-11. 10 p.

Winslow, A.G., and Kister, L.R., 1956, Saline-water resources of Texas: U.S. Geological Survey Water-Supply Paper 1365, 105 p.

APPENDIX A – Water-Level Data

Table A-1 City of Kyle well (LR 67-01-809) daily high water levels (in feet above MSL), 1997.

Day	Jan	Feb	Mar.	Apr	May	June	July	Aug.	Sept	Oct	Nov	Dec
1	575.88	574.75	574.95	575.18	577.02	577.85	583.56	581.79	580.12	N/D	N/D	N/D
2	575.88	574.75	574.95	575.18	577.02	577.85	583.53	581.74	580.04	N/D	N/D	N/D
3	575.89	574.74	574.97	575.28	576.99	577.83	583.49	581.67	579.98	N/D	N/D	N/D
4	575.89	574.73	574.99	575.48	576.97	577.82	583.46	581.59	579.94	N/D	N/D	N/D
5	575.88	574.73	574.99	575.84	576.96	577.81	583.4	581.79	579.92	N/D	N/D	N/D
6	575.88	574.74	574.97	576.02	576.96	577.87	583.36	581.78	579.87	N/D	N/D	N/D
7	575.85	574.74	574.97	576.14	576.95	579.17	583.32	581.72	579.82	N/D	N/D	N/D
8	575.84	574.73	574.97	576.19	576.94	579.34	583.25	581.64	579.75	N/D	N/D	N/D
9	575.83	574.75	574.98	576.23	576.93	580.65	583.19	581.62	579.69	N/D	N/D	N/D
10	575.82	574.74	574.99	576.27	576.93	581.38	583.14	581.58	M/F	N/D	N/D	N/D
11	575.8	574.73	574.99	576.28	576.95	581.79	583.07	581.54	M/F	N/D	N/D	N/D
12	575.8	574.76	575.01	576.26	576.95	581.91	583.01	581.47	M/F	N/D	N/D	N/D
13	575.78	574.78	575.02	576.26	576.94	581.93	582.98	581.38	M/F	N/D	N/D	N/D
14	575.8	574.78	575.02	576.27	576.94	581.93	582.95	581.31	M/F	N/D	N/D	N/D
15	575.8	574.78	575.02	576.27	576.94	581.93	582.95	581.31	M/F	N/D	N/D	N/D
16	575.8	574.8	575.06	576.27	576.89	581.9	582.84	581.15	M/F	N/D	N/D	N/D
17	575.8	574.83	575.07	576.27	576.92	581.88	582.78	581.06	M/F	N/D	N/D	N/D
18	575.82	574.81	575.07	576.28	576.92	581.82	582.72	581	M/F	N/D	N/D	N/D
19	575.82	574.8	601.7	576.29	576.92	581.78	582.66	580.93	M/F	N/D	N/D	N/D
20	575.83	574.82	601.7	576.29	577.04	581.75	582.6	580.87	M/F	N/D	N/D	N/D
21	575.84	574.81	601.7	576.3	577.07	582.08	582.54	580.8	M/F	N/D	N/D	N/D
22	575.82	574.82	601.7	576.3	577.12	583.04	582.49	580.71	M/F	N/D	N/D	N/D
23	575.81	574.84	601.7	576.27	577.19	583.41	582.44	580.65	M/F	N/D	N/D	N/D
24	574.78	574.85	601.7	576.27	577.51	583.58	582.37	580.59	M/F	N/D	N/D	N/D
25	574.75	574.88	575.1	576.41	577.69	583.63	582.3	580.55	M/F	N/D	N/D	N/D
26	574.73	574.89	575.12	576.75	577.77	583.65	582.24	580.49	M/F	N/D	N/D	N/D
27	574.73	574.9	575.13	576.93	577.79	583.65	582.18	580.43	M/F	N/D	N/D	N/D
28	574.7	574.93	575.14	576.98	577.83	583.65	582.12	580.38	M/F	N/D	N/D	N/D
29	574.71		575.13	577.02	577.85	583.64	582.03	580.32	M/F	N/D	N/D	N/D
30	574.72		575.13	577.02	577.85	583.61	581.91	580.26	M/F	N/D	N/D	N/D
31	574.73		575.13		577.85		581.83	580.2		N/D		N/D

Table A-2 Landa Park well (DX-68-23-302) daily high water levels (in feet above MSL), 1997.

1	623.6	623.7	624.0	624.4	625.1	N/D	N/D	N/D	N/D	625.4	625.9	626.1
2	623.6	623.7	624.0	624.4	625.1	N/D	N/D	N/D	N/D	625.4	625.8	626.0
3	623.6	623.7	624.1	624.7	625.1	N/D	N/D	N/D	N/D	625.3	625.8	626.0
4	623.6	623.7	624.1	624.7	625.0	N/D	N/D	N/D	625.4	625.3	625.8	626.0
5	623.6	623.7	624.1	624.8	625.0	N/D	N/D	N/D	625.4	625.3	625.8	626.0
6	623.6	623.6	624.1	624.9	625.0	N/D	N/D	N/D	625.4	625.3	625.8	626.0
7	623.6	623.6	624.1	624.9	625.0	N/D	N/D	N/D	625.5	625.3	625.8	626.0
8	623.6	623.6	624.1	624.9	625.0	N/D	N/D	N/D	625.5	625.4	625.8	626.0
9	623.6	623.6	624.1	624.9	625.0	N/D	N/D	N/D	625.5	625.4	625.8	626.0
10	623.6	623.7	624.2	625.0	625.0	N/D	N/D	N/D	625.5	625.5	625.8	626.0
11	623.6	623.7	624.2	625.0	625.0	N/D	N/D	N/D	625.5	625.6	625.8	625.9
12	623.6	623.7	624.2	625.0	625.0	N/D	N/D	N/D	625.5	625.6	625.8	625.9
13	623.6	623.9	624.2	625.1	625.0	N/D	N/D	N/D	625.5	625.7	625.9	625.9
14	623.6	623.8	624.2	625.1	625.1	N/D	N/D	N/D	625.5	625.7	625.9	625.9
15	623.6	623.7	624.2	625.1	625.1	N/D	N/D	N/D	625.4	625.7	625.9	625.9
16	623.6	623.8	624.3	625.1	625.1	N/D	N/D	N/D	625.4	625.7	625.9	625.9
17	623.6	623.8	624.3	625.1	625.1	N/D	N/D	N/D	625.4	625.8	625.9	625.9
18	623.6	623.8	624.4	625.1	625.1	N/D	N/D	N/D	625.3	625.8	625.9	625.9
19	623.6	623.8	624.4	625.1	625.1	N/D	N/D	N/D	625.3	625.8	626.0	625.9
20	623.6	623.8	624.4	625.0	625.1	N/D	N/D	N/D	625.3	625.8	626.0	626.4
21	623.6	623.8	624.4	625.0	625.4	N/D	N/D	N/D	625.3	625.8	626.0	626.2
22	623.6	623.9	624.4	625.0	625.3	N/D	N/D	N/D	625.3	625.8	626.0	626.1
23	623.6	623.9	624.4	625.2	625.3	N/D	N/D	N/D	625.4	626.1	626.0	626.1
24	623.7	623.9	624.4	625.2	625.3	N/D	N/D	N/D	625.4	625.9	626.0	N/D
25	623.7	623.9	624.4	625.2	M/F	N/D	N/D	N/D	625.4	625.9	626.0	N/D
26	623.7	623.9	624.4	625.2	M/F	N/D	N/D	N/D	625.4	625.9	626.0	N/D
27	623.7	624.0	624.4	625.2	M/F	N/D	N/D	N/D	625.4	625.9	626.0	N/D
28	623.7	624.0	624.4	625.2	M/F	N/D	N/D	N/D	625.4	625.9	626.0	N/D
29	623.7		624.4	625.2	M/F	N/D	N/D	N/D	625.4	625.9	626.0	N/D
30	623.7		624.4	625.2	M/F	N/D	626.1	N/D	625.4	625.9	626.1	N/D
31	623.7		624.4		M/F		N/D	N/D		625.9		N/D

"M/F" 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), 1997.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	M/F	674.2	677.4	680.8	687.2	689.1	690.8	690.5	691.1	691.8	696.2	697.8
2	M/F	674.1	677.8	681.2	687.3	688.9	690.8	690.5	690.9	691.6	695.9	697.8
3	M/F	673.9	677.6	681.6	687.1	688.3	690.8	690.3	690.8	691.4	695.7	697.8
4	M/F	673.6	677.5	682.6	686.7	687.1	690.8	690.2	690.8	691.4	695.8	697.7
5	M/F	673.0	677.5	682.8	686.7	685.9	690.8	690.0	690.9	691.2	695.7	697.7
6	M/F	672.8	677.4	683.3	686.6	684.8	690.8	695.6	691.2	691.2	695.5	697.8
7	M/F	672.8	677.7	683.8	686.4	684.4	690.8	695.6	691.3	692.5	695.4	698.1
8	M/F	672.7	677.9	684.3	686.3	684.5	690.8	695.5	691.4	691.7	695.5	698.1
9	M/F	672.8	677.9	684.7	686.7	684.5	690.8	695.7	691.4	692.1	695.6	698.2
10	M/F	672.8	677.9	685.2	686.4	686.1	690.8	695.6	691.4	692.6	695.5	698.0
11	M/F	672.7	678.1	685.4	686.7	686.7	690.8	695.6	691.5	693.4	695.7	697.8
12	M/F	673.0	678.5	685.5	690.5	687.3	690.8	695.5	691.6	694.0	696.1	697.7
13	M/F	673.3	678.8	685.7	687.2	687.6	690.8	695.2	691.5	694.2	696.4	697.8
14	M/F	673.5	678.9	685.9	687.2	687.7	690.8	694.9	691.4	694.6	696.5	697.8
15	M/F	673.5	678.9	685.9	687.2	687.7	690.8	694.9	691.4	694.6	696.5	697.8
16	M/F	674.0	679.4	686.1	687.1	688.9	690.8	694.7	691.2	695.4	696.5	697.9
17	M/F	674.4	679.7	686.1	687.2	689.3	690.8	694.3	691.0	695.7	696.8	697.8
18	M/F	674.7	679.9	686.2	687.1	689.5	690.8	693.9	690.9	695.9	697.0	697.8
19	M/F	674.9	680.0	686.4	686.9	689.6	690.8	693.3	690.6	696.0	697.2	697.8
20	M/F	675.1	680.3	686.5	686.8	689.6	690.8	693.0	690.5	696.0	697.4	700.5
21	675.1	675.7	680.5	686.6	686.9	690.4	690.8	692.6	690.5	696.0	697.5	698.1
22	675.1	675.8	680.5	686.5	687.1	690.9	690.8	692.3	690.9	696.1	697.5	698.4
23	675.1	676.0	680.5	686.5	687.5	690.8	690.8	692.1	691.3	696.4	697.4	698.9
24	675.1	676.3	680.6	686.5	688.0	690.8	690.8	692.0	691.5	696.5	697.4	698.8
25	674.9	676.7	680.5	686.5	688.3	690.8	690.8	692.1	691.7	696.5	697.5	698.8
26	674.7	676.7	680.3	686.5	688.6	690.8	690.8	692.1	692.0	696.3	697.6	700.0
27	674.7	676.7	680.4	686.6	689.4	690.8	690.8	692.1	692.1	696.1	697.8	699.0
28	674.5	676.7	680.5	686.9	688.8	690.8	690.8	691.9	692.1	696.1	697.9	699.2
29	674.3		680.5	687.1	689.0	690.8	690.8	691.8	692.0	696.1	697.8	699.3
30	674.2		680.3	687.2	689.2	690.8	690.8	691.6	691.9	696.1	697.8	699.3
31	674.2		680.2		689.2		690.6	691.4		696.2		699.2

Table A-4 City of Hondo index well (TD-69-47-306) daily high water levels (in feet above MSL), 1997.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	691.0	689.2	694.1	697.41	706.9	708.8	726.8	719.8	713.7	716.5	719.4	720.8
2	691.1	689.2	694.0	697.87	707.1	707.8	726.8	720.1	713.7	715.8	719.0	721.07
3	691.2	689.1	694.2	698.95	706.6	704.9	726.8	719.8	713.5	716.2	718.7	721.01
4	691.2	688.4	694.4	699.99	706.1	701.8	726.6	719.6	713.9	715.6	718.7	720.83
5	690.8	687.6	694.5	700.94	706.2	699.2	726.4	719.2	714.3	715.5	718.8	720.82
6	690.9	687.4	694.3	701.67	705.9	698.7	726.0	720.1	714.6	716.2	718.1	720.78
7	691.3	687.6	694.5	702.32	704.7	701.6	725.7	718.5	715.0	716.7	718.0	721.16
8	691.6	687.4	694.6	702.92	704.2	702.2	725.0	718.6	714.9	717.1	718.4	721.18
9	691.7	687.5	694.6	703.37	704.7	704.2	724.4	718.9	714.9	717.6	718.4	721.26
10	691.8	687.5	694.6	703.97	705.5	705.6	723.8	718.9	714.8	718.5	718.3	720.91
11	691.6	687.1	694.8	704.21	705.9	706.7	723.3	718.8	714.6	719.5	718.8	720.7
12	691.5	688.1	695.4	704.3	706.1	707.1	723.0	718.1	714.6	720.3	719.5	720.58
13	691.4	688.7	695.9	704.56	706.3	707.4	722.2	717.6	714.8	720.5	719.9	720.68
14	691.6	689.2	696.0	704.63	706.5	707.5	722.2	717.7	714.3	720.9	720.0	720.71
15	691.7	689.8	696.2	704.7	706.3	708.8	721.7	717.5	714.3	721.3	720.0	720.76
16	691.6	690.0	696.6	704.8	706.0	709.9	721.9	717.3	714.2	721.4	720.2	720.72
17	691.5	690.2	696.9	704.8	705.2	710.6	722.0	717.0	713.9	721.7	720.5	720.49
18	691.5	690.4	697.3	704.7	704.5	710.7	721.9	716.1	713.7	721.9	720.7	720.26
19	691.7	690.6	697.4	704.6	704.3	710.6	721.7	715.6	713.2	721.9	720.7	720.2
20	691.9	691.1	697.7	704.7	703.8	710.6	721.1	715.4	713.0	721.9	720.9	720.55
21	691.9	691.2	698.0	704.9	705.8	712.1	721.0	715.0	713.8	721.8	720.9	720.85
22	691.3	691.3	698.0	705.1	706.6	716.9	721.8	714.5	714.4	721.7	720.9	721.29
23	691.2	691.7	697.9	705.2	707.4	720.0	721.9	714.7	714.9	722.1	720.7	721.65
24	690.7	691.9	697.9	704.8	708.2	721.9	722.2	714.8	717.1	722.2	720.6	721.73
25	690.4	692.5	697.8	704.7	708.7	723.3	721.7	715.0	717.2	722.1	720.6	721.85
26	690.4	692.7	697.6	705.0	708.9	724.4	721.2	715.0	717.4	721.6	720.8	721.89
27	690.4	692.9	697.1	705.4	709.0	725.4	720.9	714.8	717.4	721.6	721.0	722.04
28	690.0	693.8	697.2	706.1	709.3	726.1	720.4	714.7	717.2	719.6	721.2	722.23
29	690.0		697.2	706.5	709.5	726.6	719.9	714.4	717.1	719.0	720.9	722.19
30	689.8		697.0	706.8	709.6	726.8	719.7	713.9	717.1	719.3	720.8	722.26
31	689.6		697.1	706.9	709.6		719.7	713.7		719.4		722

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

Table A-5 J-17, Bexar County index well (AY-68-37-203) daily high water levels (in feet above MSL), 1997.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	650.7	650.5	654.6	656.9	662.6	665.5	677.7	667.6	659.8	661.6	666.2	669.6
2	651.0	649.9	654.6	657.6	662.6	664.9	677.5	667.0	659.2	661.3	666.7	669.3
3	650.9	649.4	654.8	659.2	662.0	664.0	677.2	666.9	659.1	661.0	666.0	669.5
4	651.0	649.2	655.0	660.3	661.6	662.8	677.1	666.2	660.8	661.2	666.6	669.4
5	650.9	648.7	655.1	661.3	661.2	662.1	677.0	666.2	661.5	661.3	666.4	669.4
6	650.8	648.8	655.1	662.1	660.7	661.6	676.7	665.7	662.0	661.7	666.3	669.3
7	650.7	649.5	655.1	661.9	660.8	662.1	676.2	665.4	662.2	662.5	666.1	669.5
8	650.9	649.7	655.3	662.4	660.4	662.9	675.5	666.4	661.7	663.2	666.4	669.7
9	651.0	649.9	655.4	662.8	660.9	663.1	675.1	667.4	661.4	664.0	666.6	669.5
10	651.0	649.7	655.2	662.9	661.5	664.0	674.4	667.5	662.1	665.1	666.9	669.5
11	651.0	649.6	655.0	663.3	662.0	664.8	673.9	665.6	662.3	666.4	667.4	669.3
12	650.9	650.0	655.6	663.4	662.0	665.0	673.6	665.2	662.4	667.3	668.1	669.1
13	650.5	650.8	656.4	663.4	662.1	665.0	673.1	665.1	662.2	667.9	668.9	669.6
14	650.6	651.3	656.7	663.2	661.9	665.3	672.5	664.5	661.9	668.0	669.0	669.6
15	650.3	651.7	657.2	663.0	661.7	666.0	671.9	664.0	661.1	669.2	669.4	669.5
16	650.2	651.8	657.5	662.6	662.4	666.7	671.2	663.6	660.5	668.6	669.4	669.4
17	650.4	651.8	657.9	662.4	663.1	666.9	670.8	663.1	660.0	668.4	669.3	669.3
18	650.6	651.8	657.9	662.2	663.1	666.9	670.2	662.8	659.4	668.4	669.3	669.2
19	650.6	651.7	657.8	662.8	662.6	666.6	669.9	662.8	659.4	668.3	669.4	669.1
20	650.9	652.3	657.9	662.8	662.6	666.3	669.6	661.2	659.6	668.3	669.5	669.8
21	651.0	652.9	657.9	661.9	663.1	667.7	669.6	660.6	660.3	668.0	669.8	671.1
22	651.0	652.7	657.6	661.6	663.0	671.7	670.1	660.4	661.4	667.8	669.8	671.6
23	650.7	653.1	657.4	661.1	663.7	673.8	670.1	660.5	662.1	667.8	669.7	671.7
24	650.7	653.2	657.0	660.9	664.6	675.1	669.6	661.5	662.7	668.0	669.4	671.9
25	650.6	653.6	657.0	661.3	665.2	675.8	668.9	661.3	662.9	667.9	669.1	672.0
26	650.5	654.0	657.0	662.7	665.3	676.4	668.7	661.2	663.0	667.8	669.2	672.2
27	650.5	654.3	656.8	663.4	665.1	676.9	668.1	660.9	663.0	667.8	669.4	672.3
28	650.2	654.5	657.0	663.6	665.1	677.5	667.8	660.6	662.9	667.5	669.8	672.4
29	650.4		656.3	663.3	665.6	677.8	667.8	660.4	662.8	667.4	669.8	672.4
30	650.2		656.1	662.8	665.6	677.9	667.3	660.2	662.1	667.4	669.9	672.0
31	650.2		656.5		665.6		667.5	659.9		666.5		672.6

Table A-6 City of Uvalde index well (YP-69-50-302) daily high water levels (in feet above MSL), 1997.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov	Dec
1	868.2	869.3	868.9	870.4	872.2	872.4	872.5	873.6	875.4	875.8	876.8	877.2
2	868.3	869.2	868.9	870.5	872.2	872.3	872.6	873.6	875.4	875.8	876.7	877.2
3	868.4	869.2	868.9	870.6	872.1	872.2	872.7	873.7	875.4	875.8	876.7	877.2
4	868.4	869.2	869.0	870.7	872.0	872.1	872.7	873.8	875.5	875.8	876.8	877.2
5	868.5	869.1	869.0	870.8	872.0	872.0	872.8	874.2	875.6	875.9	876.8	877.2
6	868.5	869.1	869.0	870.8	872.1	870.9	872.9	873.9	875.6	875.9	876.7	877.2
7	868.5	869.0	869.0	870.9	872.0	870.9	872.9	879.7	875.6	876.0	876.7	877.3
8	868.6	868.9	869.0	870.9	871.9	870.7	872.9	882.3	875.6	876.1	876.8	877.3
9	868.7	868.9	869.1	871.0	871.9	870.8	872.9	877.3	875.6	876.1	876.8	877.3
10	868.7	868.9	869.1	871.1	872.0	870.9	872.9	874.7	875.6	876.2	876.8	877.3
11	868.8	868.8	869.2	871.1	872.0	871.0	872.9	874.7	875.6	876.4	876.9	877.3
12	868.8	868.8	869.3	871.2	872.0	870.9	872.9	874.7	875.6	876.4	876.9	877.3
13	868.8	868.8	869.4	871.2	872.2	871.0	872.9	874.7	875.6	876.4	877.0	877.3
14	868.9	868.8	869.4	871.2	872.1	871.0	872.9	874.8	875.6	876.4	877.0	877.3
15	869.0	868.7	869.4	871.3	872.1	871.2	872.9	874.8	875.6	876.4	876.9	877.3
16	869.0	868.7	869.5	871.3	872.0	871.2	872.9	874.8	875.6	876.5	876.9	877.3
17	869.0	868.7	869.5	871.4	872.1	871.2	872.9	874.8	875.7	876.5	877.0	877.3
18	869.1	868.7	869.6	871.5	872.0	871.2	872.9	874.9	875.7	876.5	877.0	877.4
19	869.1	868.7	869.6	871.5	871.9	871.3	872.9	874.9	875.6	876.5	877.0	877.4
20	869.2	868.8	869.7	871.6	872.0	871.4	872.9	874.9	875.6	876.5	877.1	877.4
21	869.2	868.8	869.8	871.6	872.0	871.5	873.0	874.8	875.7	876.6	877.1	877.4
22	869.3	868.7	869.8	871.6	872.1	871.7	873.3	874.9	875.8	876.6	877.1	877.4
23	869.3	868.7	869.8	871.7	872.2	871.8	873.3	875.0	875.8	876.7	877.1	877.5
24	869.3	868.7	869.9	871.7	872.3	871.9	873.3	875.1	875.9	876.7	877.1	877.5
25	869.3	868.8	870.0	871.8	872.3	872.0	873.3	875.2	875.8	876.7	877.1	877.5
26	869.3	868.8	870.0	871.9	872.3	872.1	873.4	875.3	875.9	876.7	877.1	877.5
27	869.3	868.9	870.1	872.0	872.3	872.2	873.4	875.3	875.9	876.7	877.2	877.5
28	869.2	868.9	870.2	872.0	872.4	872.3	873.4	875.3	875.9	876.7	877.2	877.5
29	869.3		870.2	872.1	872.4	872.4	873.4	875.3	875.8	876.7	877.2	877.5
30	869.3		870.3	872.1	872.4	872.5	873.5	875.3	875.8	876.7	877.2	877.5
31	869.3		870.3		872.4		873.5	875.4		876.7		877.5

APPENDIX B – Water-Quality Data

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hardness, total (mg/L)
Bexar													
	AY-68-28-904	07/07/97	12:00	640			23.0	591	579	266	274	7.2	300
	AY-68-29-920	06/12/97	12:00	655			25.5	468	482	201	204	7.4	220
	AY-68-30-109	06/23/97	12:00	710			24.0	562	577	265		7.3	
	AY-68-36-503	06/26/97	10:00	1,247			26.0	483	466	226	207	7.4	230
	AY-68-36-613	07/09/97	10:00				24.0	527	506	209	215	7.3	240
	AY-68-36-614	07/09/97	11:30				24.0	538	512	214	218	7.4	66
	AY-68-37-304	06/25/97	11:00	685			27.5	542	520	200	202	7.5	240
	AY-68-37-521	01/29/97	14:06	1,275	235		30.5	5,410	5,000	228	246	7.0	2,250
		02/25/97	15:03	1,275					4,900		228	7.0	2,300
		03/27/97	14:45	1,275	255		31.0	5,490	4,900	258	252	7.2	2,250
		04/28/97	13:40	1,275	340		31.4	5,420	4,900		248	7.1	1,850
		05/22/97	13:05	1,275	325		32.0	5,570	5,000	226	240	7.2	1,850
		07/28/97	16:15	1,275	305		32.5	5,500	5,100	216	241	7.0	2,000
		08/27/97	14:00	1,275	220	12	32.5	5,500	5,100	234	241	7.2	2,100
		09/30/97	13:10	1,275	350	15	32.5	5,500	5,000	226	230	7.0	2,175
		10/29/97	14:40	1,275	430		32.0	5,470	5,100		240	7.2	1,850
		11/25/97	13:20	1,275	395	20	32.0	5,430	5,000	224	230	7.0	2,000
		12/18/97	13:40	1,275	310	20	31.5	5,430	5,100	230	236	7.1	1,900
	AY-68-37-522	01/29/97	13:32	1,075	195		30.0	4,070	4,010	222	222	7.2	1,600
		02/25/97	14:37	1,075					3,920		214	7.2	1,650
		03/27/97	14:15	1,075	225		30.1	4,080	4,050	212	226	7.4	1,650
		04/28/97	13:45	1,075	345		31.0	4,110	3,800		228	7.1	1,150
		05/22/97	12:55	1,075	315		31.0	4,090	3,920	206	220	7.1	1,150
		07/28/97	16:15	1,075	305		31.5	4,090	3,800	204	220	7.1	1,400
		08/27/97	12:45	1,075	265	12	31.0	4,060	4,000	222	244	7.3	1,300
		09/30/97	12:35	1,075	315	15	31.5	4,080	3,920	192	210	7.2	1,350

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hard-ness, total (mg/L)
		10/29/97	14:10	1,075	400		31.0	4,040	3,800		222	7.1	1,300
		11/25/97	12:45	1,075	300	30	31.0	4,020	3,920	222	222	7.2	1,350
		12/18/97	13:25	1,075	295	30	31.0	4,030	3,910	212	210	7.2	1,150
Bexar	AY-68-37-523	01/29/97	14:38	1,175	270		29.5	5,580	5,250	245	248	7.0	2,300
		02/25/97	15:32	1,175					5,000		240	7.0	2,250
		03/27/97	14:30	1,175	240		30.5	5,660	5,100	234	244	7.3	2,100
		04/28/97	14:00	1,175	360		31.0	5,640	5,100		248	7.0	1,875
		05/22/97	13:20	1,175	340		31.0	5,650	5,000	230	244	7.1	1,900
		07/28/97	16:15	1,175	305		31.5	5,610	5,100	222	247	7.0	1,850
		08/27/97	13:15	1,175	235	12	31.0	5,560	5,100	240	200	7.0	2,050
		09/30/97	13:35	1,175	315	15	31.5	5,600	5,100	234	234	7.2	1,550
		10/29/97	14:30	1,175	420		31.0	5,650	5,100		240	7.2	2,000
		11/25/97	13:09	1,175	320	14.3	31.0	5,610	5,100	230	240	7.2	1,950
		12/18/97	13:50	1,175	320	14	31.0	5,580	5,300	234	232	7.1	1,900
	AY-68-37-524	01/29/97	15:28	881	300		28.0	917	920	203	204	7.4	370
		02/25/97	14:18	881					900		202	7.3	380
		03/27/97	15:15	881	315				910	190	204	7.7	375
		04/28/97	14:55	881	445		29.0	934	900		204	7.4	290
		05/22/97	14:25	881	415		28.5	925	900	188	202	7.4	290
		07/28/97	17:30	881	395		29.0	931	900	182	202	7.3	320
		08/27/97	17:00	881	530	15	29.0	932	900	202	197	7.3	200
		09/30/97	15:10	881	460	20	29.0	937	900	192	200	7.6	310
		10/29/97	16:00	881	465		28.5	937	880		200	7.5	310
		11/25/97	14:05	881	380	38	28.5	939	910	186	196	7.5	310
		12/18/97	14:50	881	365	37	28.0	930	900	190	200	7.5	315
	AY-68-37-525	01/29/97	15:58	1,150	330		28.0	6,350	6,000	260	262	7.0	2,500
		02/25/97	16:30	1,150					5,800		252	7.0	2,650

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hard-ness, total (mg/L)
		03/27/97	15:15	1,150	315		29.0	6,410	6,000	250	264	7.2	2,650
		04/28/97	15:15	1,150	465		29.5	6,410	6,000		264	7.0	2,150
		05/22/97	14:15	1,150	405		29.5	6,460	5,700	238	258	7.1	2,150
		07/28/97	17:30	1,150	395		31.5	5,690	6,000	240	258	7.0	2,250
		08/27/97	16:40	1,150	510	15	29.0	6,410	6,000	250	236	7.0	2,375
		09/30/97	14:40	1,150	430	20	29.5	6,370	6,000	246	246	7.2	2,300
Bexar		10/29/97	15:40	1,150			28.5	6,330	5,900		256	7.2	2,350
		11/25/97	14:00	1,150	375	17.6	29.5	6,330	5,900	244	258	7.1	2,300
		12/18/97	15:04	1,150	379	17	29.0	6,370	6,000	254	246	7.2	2,475
	AY-68-37-526	01/30/97	16:23	1,223	365		24.5	740	740	205	204	7.5	312
		02/28/97	16:12	1,223					740		200	7.3	332
		03/27/97	13:00	1,223	240	10	25.5	789	780	192	206	7.8	340
		04/28/97	15:55	1,223	445		26.0	824	780		206	7.4	304
		05/22/97	15:05	1,223	465		26.5	830	800	186	202	7.5	312
		07/28/97	14:30	1,223	215		27.0	836	810	180	200	7.5	348
		08/27/97	15:05	1,223		12	27.0	827	800	194	202	7.4	344
		09/30/97	16:00	1,223	405	20	27.0	849	810	196	202	7.7	348
		10/29/97	17:00	1,223	460		26.0	851	810		202	7.4	344
		11/25/97	14:55	1,223	235	14.3	26.0	853	820	191	204	7.6	340
		12/18/97	15:55	1,223	415	14	26.0	870	860	184	198	7.5	352
	AY-68-37-527	01/30/97	15:44	926	325		26.5	516	510	201	200	7.4	240
		02/28/97	15:37	926					490		200	7.2	232
		03/27/97	13:00	926	240		26.5	506	490	190	202	7.7	236
		04/28/97	16:15	926	465		26.5	510	500		208	7.4	204
		05/22/97	14:55	926	455		26.5	520	490	186	244	7.7	196
		07/28/97	14:30	926	215		26.5	498	500	182	199	7.5	224
		08/27/97	15:00	926	420	30	27.0	513	490	194	202	7.2	224

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hard-ness, total (mg/L)
		09/30/97	15:45	926	390	100	27.0	508	490	214	198	7.8	224
		10/29/97	16:50	926			26.6	502	482		200	7.5	214
		11/25/97	15:05	926	245	100	26.5	511	495	186	198	7.7	218
		12/18/97	15:45	926	405	100	26.5	510	500	190	198	7.5	220
	AY-68-43-811	06/24/97	17:00	2,298			27.5	637	619	208		7.4	
	AY-68-44-217	06/25/97	15:00	1,319			26.5	464	457	189	191	7.6	220
Comal													
	DX-68-15-901	09/17/97	13:45			64	22.0	590	510	261	218	7.3	274
	DX-68-23-301	07/31/97	11:00				23.5	556	533	232	223	7.4	260
	DX-68-23-303	06/11/97	11:00	1,045			24.5	553	551	215		7.5	
	DX-68-23-616A	01/28/97	12:30	576	65		25.0	2,890	2,940	272	272	7.2	800
		02/27/97	13:55	576	65	12.5	25.4	2,890	2,840	268	268	7.2	830
		03/26/97	14:30	576	45		25.0	2,880	2,800		178	7.3	860
		04/30/97	15:30	576	80	12	25.5	2,830	2,780		280	7.2	660
		07/22/97	14:45	576	45	12	25.5	2,870	2,820	254	279	7.2	720
		08/26/97	14:00	576	55	12	25.5	2,890	2,870	354	275	7.1	810
		09/24/97	13:35	576	45	12	25.5	2,890	2,830	264	278	7.1	800
		10/30/97	17:05	576	50	10	25.5	2,880	2,730	264	270	7.2	780
		12/19/97	14:45	576	55	10	25.0	2,840	2,870	248	266	7.2	770
	DX-68-23-616B	01/28/97	12:45	738	72		26.0	1,743	1,750	216	230	7.3	540
		02/27/97	13:53	738	63	12.5	26.1	1,740	1,680	228	232	7.2	550
		03/26/97	14:30	738	45		26.0	1,737	1,680		236	7.5	540
		04/30/97	15:40	738	80	12.5	26.0	1,712	1,680		236	7.3	380
		07/22/97	14:45	738	45	12	26.5	1,720	1,650	212	230	7.4	420
		08/26/97	14:00	738	55	12	26.5	1,701	1,190	244	230	7.3	480
		09/24/97	13:35	738	45	12	26.0	1,676	1,670	228	228	7.2	505
		10/30/97	17:10	738	55	10	26.0	1,712	1,650	218	234	7.3	490

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hard-ness, total (mg/L)
		12/19/97	14:45	738	55	10	26.0	1,712	1,700	234	214	7.2	500
	DX-68-23-617	01/28/97	10:48	917	58		25.5	567	560	220	224	7.4	272
		02/27/97	12:15	917	55	12.5	26.0	567	520	212	222	7.3	278
		03/26/97	12:45	917	45		26.0	569	530		224	7.6	276
		04/30/97	11:30	917	79	12	26.5	569	520		222	7.5	240
		07/22/97	11:00	917	60	12	26.5	564	520	206	224	7.5	264
		08/26/97	11:30	917	55	12	26.5	561	520	228	220	7.4	286
		09/24/97	10:50	917	65	12	26.5	568	520	218	222	7.3	210
		10/30/97	11:05	917	50	11.6	26.0	568	510	208	224	7.4	280
Comal		12/19/97	11:15	917	75	11.5	26.0	565	530	206	226	7.4	240
	DX-68-23-618	01/28/97	10:40	660	50		24.5	628	610	204	204	7.5	260
		02/27/97	12:13	660	53	12.5	25.4	626	580	193	214	7.3	268
		03/26/97	12:45	660	45		25.5	629	580		208	7.5	264
		04/30/97	11:35	660	84	12.3	25.5	622	580		212	7.6	224
		07/22/97	11:00	660	60	12	25.5	628	580	184	208	7.5	256
		08/26/97	11:30	660	55	12	25.5	608	600	206	202	7.6	276
		09/24/97	10:50	660	65	12	25.5	619	590	198	206	7.5	190
		10/30/97	11:10	660	55	11.6	25.5	623	580	218	206	7.4	270
		12/19/97	11:15	660	75	11.5	25.5	625	600	196	204	7.5	210
	DX-68-23-619A	01/28/97	12:05	652	55		25.3	539	520	200	206	7.5	240
		02/27/97	10:38	652	53	12.5	25.5	537	510	194	202	7.3	254
		03/26/97	11:00	652	45		25.5	541	500		208	7.5	248
		04/30/97	13:50	652	89	9.3	26.0	537	500		208	7.5	216
		07/22/97	9:45	652	45	12	25.5	539	510	184	204	7.5	236
		08/26/97	9:45	652	55	12	26.0	539	500	202	204	7.5	260
		09/24/97	12:20	652	60		26.0	530	510	194	214	7.4	170
		10/30/97	15:05	652	55	8.5	25.5	540	500	188	202	7.5	250

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hard-ness, total (mg/L)
		12/19/97	13:00	652	55	8.5	25.5	532	510	192	202	7.5	180
	DX-68-23-619B	01/28/97	12:08	787	58		26.0	563	530	220	224	7.5	260
		02/27/97	10:40	787	55	12.5	26.0	562	530	208	220	7.3	276
		03/26/97	11:00	787	45		26.2	561	510		228	7.5	272
		04/30/97	13:40	787	79	9.3	26.5	560	530		228	7.6	228
		07/22/97	9:45	787	45	12	26.5	558	520	208	226	7.4	264
		08/26/97	9:45	787	55	12	26.5	553	520	212	222	7.5	280
		09/24/97	12:20	787	60	12	26.5	552	530	216	220	7.4	190
		10/30/97	15:05	787	55		26.0	543	510	214	222	7.5	274
		12/19/97	13:00	787	55	12	26.0	562	530	206	222	7.5	200
Hays													
	LR-67-01-812	06/12/97	16:00	543	45	12	24.5	14,810	11,500		383	6.8	3,200
		08/19/97	9:50	543	50	12	24.5	14,810	13,800	340	380	6.8	3,600
		12/17/97	17:05	543	50	12	24.5	14,800	13,500	354	350	6.9	3,550
	LR-67-01-813A	06/12/97	14:30	564	55	12	24.5	14,880	11,800		378	6.9	3,300
		08/19/97	12:05	564	55	12	24.5	14,700	14,000	330	374	6.9	3,600
		12/17/97	14:55	564	55	12	24.5	14,680	13,400	380	366	7.0	3,250
	LR-67-01-813B	06/12/97	14:30	699	55	12	25.5	14,780	11,500		376	6.8	3,200
		08/19/97	12:05	699	55	12	25.5	14,810	14,000	338	372	6.8	3,600
		12/17/97	14:55	699	55	12	25.5	14,620	13,800	364	356	7.0	3,350
	LR-67-01-814A	06/12/97	11:15	556	87	12	25.0	14,740	12,100		376	6.8	3,250
		08/19/97	15:20	556	50	12	25.5	14,600	14,000	358	376	6.9	3,600
		12/17/97	11:35	556	82	12	24.5	14,710	14,000	370	366	6.9	3,400
	LR-67-01-814B	06/12/97	11:15	726	87	12	26.0	14,930	12,000		376	6.8	3,300
		08/19/97	15:20	726	50	12	26.5	14,770	13,900	362	370	6.9	3,500
		12/17/97	11:35	726	102	12	26.0	14,740	13,700	346	366		3,450
	LR-67-01-819	08/28/97	11:00				22.5	600	569	260	222	7.4	290

Analytical data for selected properties and common inorganic constituents in water from wells completed in the Edwards Aquifer, 1997.

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)	Conductivity, field (µS/cm)	Specific conductance @25 oC (µS/cm)	Alkalinity, field (mg/L)	Alkalinity, lab (mg/L)	pH	Hardness, total (mg/L)
	LR-67-01-820	08/28/97	13:00				21.5	600	584	258	265	7.3	300
	LR-67-09-106	06/10/97	13:00	402			23.0	594	591	250	258	7.4	280
Medina													
	TD-68-33-502	07/15/97	14:00	1,475			23.5	489	487	196	196	7.5	230
	TD-68-42-111	07/10/97	9:00	1,358			24.5	492	476	210	203	7.5	230
	TD-68-42-506	07/16/97	10:00	1,445			26.0	498	482	200	202	7.5	230
	TD-68-49-201	07/17/97	13:00				29.0	501	494	195	184	7.4	220
	TD-68-49-301	07/17/97	10:00				32.5	480	462	199	194	7.5	220
	TD-69-39-905	07/09/97	16:00	565			23.0	638		267	272		280
	TD-69-40-403	07/08/97	9:30	518			23.5	451	461	218	221	7.3	230
	TD-69-46-601	08/20/97	10:00	1,289			24.0	462	474	207	209	7.4	230
	TD-69-47-303	07/08/97	14:00	1,803			24.5	465	461	203	207	7.4	230
	TD-69-47-604	07/16/97	12:00	1,560			23.5	498	497	202	194	7.5	240
	TD-69-47-702	07/14/97	18:00	1,500			23.5	519	495	200	187	7.5	220
	TD-69-55-606	07/15/97	11:00	2,498			24.5	525	524	204	207	7.5	250
Uvalde													
	YP-69-45-405	08/14/97	9:00	1,211			23.0	467	475	208	212	7.5	230
	YP-69-43-303	08/19/97	13:00	750			23.5	454	445	181	184	7.5	210
	YP-69-43-606	08/18/97	14:00	698			24.5	514	512	203	206	7.3	240
	YP-69-45-102	08/19/97	10:00	1,594			26.0	465	472	202	206	7.5	230
	YP-69-45-401	08/11/97	15:00	1,476			25.5	504	496	207	212	7.4	240
	YP-69-50-340	08/13/97	9:00	478			24.0	530	525	206	210	7.3	240
	YP-69-50-501	08/13/97	14:00	600			23.5	1,200	1,170	220	228	7.1	450

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
Bexar											
	AY-68-28-904	07/07/97	95	15	8.2	1.10	13	19	0.21	12.0	328
	AY-68-29-920	06/12/97	63	15	9.3	1.10	19	18	0.20	12.0	267
	AY-68-36-503	06/26/97	67	15	8.5	1.10	17	16	0.19	12.0	282
	AY-68-36-613	07/09/97	70	15	11.0	1.10	20	20	0.21	13.0	285
	AY-68-36-614	07/09/97	70	15	11.0	1.20	20	21	0.19	13.0	398
	AY-68-37-304	06/25/97	65	20	13.0	1.40	27	39	0.57	12.0	302
	AY-68-37-521	01/29/97	562	205	478.0	29.50	880	1,904	5.00	9.1	4,542
		02/25/97	554	206	487.0	29.30	930	1,901	5.75	8.7	4,694
		03/27/97	555	204	488.0	28.90	910	2,020	5.00	9.2	4,844
		04/28/97	561	206	481.0	29.00	910	1,972	4.50	8.7	4,688
		05/22/97	574	207	388.0	29.60	900	1,830	4.83	8.7	4,608
		07/28/97	556	203	470.0	28.90	940	1,690	4.10	8.6	4,746
		08/27/97	519	202	479.0	29.40	960	1,790	3.85	9.4	4,892
		09/30/97	548	205	480.0	29.90	960	1,922	4.75	9.2	4,644
		10/29/97	542	205	533.0	17.30	930	1,567	4.65	9.3	4,560
		11/25/97	560	212	595.0	28.00	930	1,914	5.00	7.6	4,360
		12/18/97	523	195	584.0	25.10	850	1,992	6.25	9.8	4,720
	AY-68-37-522	01/29/97	403	145	463.0	22.70	610	1,310	4.00	7.7	3,248
		02/25/97	414	151	344.0	22.60	670	1,317	5.00	7.1	3,372
		03/27/97	406	147	485.0	21.80	650	1,410	4.38	8.2	3,428
		04/28/97	410	148	340.0	22.30	630	1,400	3.25	6.6	3,340
		05/22/97	429	151	343.0	22.70	640	1,330	4.25	7.8	3,352
		07/28/97	392	141	337.0	22.20	650	1,309	3.10	7.4	3,380
		08/27/97	372	144	354.0	23.00	680	1,317	3.85	8.3	3,328
		09/30/97	395	147	353.0	23.30	670	1,290	3.25	8.2	3,324
		10/29/97	389	148	346.0	11.40	650	1,079	4.35	8.3	3,280
		11/25/97	390	147	432.0	19.00	640	1,281	3.98	3.9	3,268

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
		12/18/97	377	135	467.0	15.70	580	1,335	4.75	8.6	3,376
	AY-68-37-523	01/29/97	544	214	468.0	303.00	900	1,843	5.75	8.4	4,560
		02/25/97	553	220	511.0	30.60	970	1,842	5.75	8.3	4,792
		03/27/97	544	215	492.0	29.90	950	1,924	4.50	8.6	4,900
		04/28/97	544	217	485.0	29.10	950	1,860	4.10	8.4	4,692
		05/22/97	555	216	489.0	30.50	930	1,745	4.83	7.5	4,672
		07/28/97	535	211	484.0	29.60	950	1,668	3.93	7.7	4,724
		08/27/97	501	212	493.0	30.30	1,000	1,749	3.85	8.8	4,800
		09/30/97	550	219	498.0	31.20	960	1,733	4.75	8.5	4,740
		10/29/97	542	210	542.0	16.80	950	1,916	4.45	8.6	4,452
		11/25/97	536	213	640.0	28.00	940	1,934	5.50	5.2	4,528
		12/18/97	519	203	703.0	22.50	860	1,872	5.75	9.1	4,668
	AY-68-37-524	01/29/97	94	33	43.4	3.80	80	170	1.40	6.4	588
		02/25/97	94	33	48.0	3.10	100	170	1.48	6.3	628
		03/27/97	96	33	59.8	3.40	95	189	1.44	6.7	652
		04/28/97	96	32	46.5	3.90	100	179	1.40	6.5	652
		05/22/97	97	33	48.5	3.60	90	178	1.40	6.4	664
		07/28/97	86	31	47.4	4.40	90	161	1.39	6.1	644
		08/27/97	85	32	45.8	4.30	100	171	1.37	6.8	420
		09/30/97	86	32	51.6	4.30	100	184	1.39	6.6	632
		10/29/97	89	33	57.0	0.90	95	144	1.39	6.8	648
		11/25/97	91	32	66.0	2.00	90	171	1.40	5.3	820
		12/18/97	86	31	70.3	1.50	80	180	1.45	7.2	656
	AY-68-37-525	01/29/97	606	257	582.0	35.20	1,100	2,128	5.50	7.5	5,304
		02/25/97	607	260	572.0	34.30	1,350	2,183	6.75	8.1	5,516
		03/27/97	604	261	563.0	33.40	1,300	2,268	5.00	8.6	5,604
		04/28/97	604	259	559.0	32.80	1,300	2,146	5.75	8.4	5,436
		05/22/97	605	263	554.0	35.90	1,300	2,060	6.08	8.3	5,356

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
		07/28/97	571	252	575.0	34.20	1,200	1,956	5.83	7.9	5,468
		08/27/97	566	253	540.0	33.70	1,350	2,104	4.58	8.7	5,540
		09/30/97	595	252	593.0	35.50	1,350	2,114	5.50	8.5	5,356
		10/29/97	588	253	619.0	20.60	1,250	1,470	4.73	8.7	5,214
		11/25/97	592	259	759.0	33.00	1,150	2,272	6.00	4.4	5,012
		12/18/97	584	253	814.0	26.40	1,150	2,208	5.75	9.2	5,008
	AY-68-37-526	01/30/97	82	27	28.6	1.60	56	107	0.58	5.3	404
		02/28/97	83	28	32.0	1.10	64	116	0.67	4.1	492
		03/27/97	85	28	29.8	1.60	66	122	0.68	5.7	536
		04/28/97	89	29	34.7	2.30	68	131	0.76	5.5	532
		05/22/97	91	30	38.0	2.10	72	142	0.75	5.4	584
		07/28/97	84	29	36.8	2.70	74	138	0.76	5.0	572
		08/27/97	79	28	34.1	2.50	76	131	0.69	5.8	428
		09/30/97	82	30	39.3	2.60	76	136	0.77	5.6	552
		10/29/97	80	30	40.0	0.30	78	149	0.76	5.7	576
		11/25/97	83	32	53.0	1.00	74	138	0.79	2.2	752
		12/18/97	82	30	57.9	<1	70	152	0.78	6.0	664
	AY-68-37-527	01/30/97	66	18	12.6	<1	25	31	0.27	5.5	276
		02/28/97	64	18	12.3	<1	28	27	0.33	5.4	280
		03/27/97	66	18	11.1	<1	28	30	0.27	5.7	344
		04/28/97	65	18	10.8	1.10	27	29	0.31	5.4	312
		05/22/97	67	18	11.6	<1	27	29	0.32	5.2	332
		07/28/97	60	17	12.0	1.30	26	28	0.30	4.6	324
		08/27/97	52	17	11.3	1.20	29	28	0.31	5.8	312
		09/30/97	58	17	13.0	1.00	29	28	0.35	5.5	292
		10/29/97	58	17	10.0	<0.1	25	27	0.30	5.5	280
		11/25/97	64	17	17.0	<1	27	29	0.37	4.4	300
		12/18/97	62	16	15.5	<1	25	28	0.34	6.2	296

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
	AY-68-43-811	06/24/97									
	AY-68-44-217	06/25/97	61	17	9.7	1.20	24	20	0.24	10.0	259
Comal											
	DX-68-15-901	09/17/97	57	11	9.2	1.20	16	17	0.17	5.5	344
	DX-68-23-301	07/31/97	78	16	9.7	1.30	16	22	0.21	12.0	303
	DX-68-23-303	06/11/97									
	DX-68-23-616A	01/28/97	158	101	301.0	20.20	520	564	4.00	6.2	1,872
		02/27/97	152	102	299.0	20.20	530	549	4.20	6.2	1,984
		03/26/97	156	99	286.0	18.00	540	543	4.00	6.7	2,156
		04/30/97	167	100	310.0	20.10	540	542	3.65	6.6	1,806
		07/22/97	156	101	300.0	20.10	530	610	3.30	6.1	2,060
		08/26/97	156	101	329.0	20.70	540	562	3.56	6.6	1,940
		09/24/97	152	97	262.0	21.50	540	533	3.77	6.5	1,952
		10/30/97	136	99	300.0	9.50	510	480	3.35	6.9	1,856
		12/19/97	153	98	398.0	11.80	470	562	3.96	6.8	2,040
	DX-68-23-616B	01/28/97	97	63	152.0	11.20	280	307	3.75	6.0	1,108
		02/27/97	97	64	137.0	10.10	290	312	3.80	4.9	1,188
		03/26/97	97	63	139.0	10.20	300	312	3.65	6.4	1,308
		04/30/97	98	64	145.0	9.70	300	306	3.51	6.3	1,032
		07/22/97	98	62	149.0	10.10	290	318	3.30	4.7	1,140
		08/26/97	98	64	167.0	10.80	300	297	3.52	6.2	1,132
		09/24/97	97	61	129.0	10.70	280	289	3.47	6.2	1,232
		10/30/97	94	63	149.0	3.80	270	275	3.35	6.6	1,160
		12/19/97	98	61	199.0	4.90	250	301	3.65	6.7	1,272
	DX-68-23-617	01/28/97	59	28	10.3	1.10	21	53	1.20	5.4	288
		02/27/97	59	28	9.8	<1	21	53	1.28	5.5	344
		03/26/97	58	27	9.7	1.20	20	51	1.34	6.0	400
		04/30/97	59	27	10.6	1.10	21	53	1.37	5.7	248

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
		07/22/97	58	27	11.0	1.40	19	59	1.24	5.5	340
		08/26/97	57	28	11.3	1.60	22	52	1.27	5.8	344
		09/24/97	57	26	10.2	1.60	19	52	1.22	5.7	408
		10/30/97	55	27	11.0	<1.0	21	47	1.24	6.0	332
		12/19/97	54	27	13.2	<1	18	52	1.44	6.5	408
	DX-68-23-618	01/28/97	52	32	51.0	1.60	46	61	2.93	5.8	320
		02/27/97	50	33	24.8	1.20	50	61	2.85	5.9	372
		03/26/97	52	33	23.1	1.70	48	60	2.55	6.3	432
		04/30/97	53	33	26.0	1.70	48	60	2.70	6.2	328
		07/22/97	53	32	26.4	2.10	46	67	2.50	5.8	400
		08/26/97	50	33	26.8	2.60	50	61	2.83	6.0	340
		09/24/97	50	31	22.2	2.30	44	60	2.57	6.2	352
		10/30/97	48	32	26.0	<1.0	44	52	2.55	6.4	348
		12/19/97	50	33	34.3	<1	40	60	2.95	6.8	420
	DX-68-23-619A	01/28/97	50	30	14.1	<1	26	46	2.75	5.8	288
		02/27/97	49	31	14.8	<1	26	44	2.80	6.0	312
		03/26/97	50	30	13.1	1.10	25	44	2.55	6.5	364
		04/30/97	50	30	14.4	1.10	26	43	2.60	6.0	240
		07/22/97	52	29	14.1	1.30	24	49	2.40	5.2	336
		08/26/97	48	30	14.6	1.70	27	44	2.55	6.0	300
		09/24/97	47	29	13.3	1.70	25	43	2.25	6.0	272
		10/30/97	48	29	13.0	<1.0	24	42	2.35	6.4	272
		12/19/97	47	29	17.8	<1	23	44	2.70	7.1	388
	DX-68-23-619B	01/28/97	59	26	10.9	<1	21	50	1.54	5.5	312
		02/27/97	58	26	10.4	<1	21	48	1.58	5.6	332
		03/26/97	59	26	10.4	<1	21	48	1.55	6.1	396
		04/30/97	60	27	11.2	<1	22	47	1.56	5.9	264
		07/22/97	58	25	11.7	1.10	20	51	1.48	5.4	344

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
		08/26/97	56	26	12.2	1.70	23	46	1.53	5.7	340
		09/24/97	57	25	10.9	1.40	21	47	1.47	5.6	330
		10/30/97	52	25	11.0	<1.0	20	48	1.52	6.0	300
		12/19/97	57	25	14.2	<1	19	47	1.64	6.6	400
Hays											
	LR-67-01-812	06/12/97	905	468	1,940.0	84.00	3,550	2,740	6.50	7.1	11,600
		08/19/97	881	447	1,990.0	90.70	4,200	2,847	5.50	8.1	11,780
		12/17/97	810	443	2,509.0	120.40	3,750	2,862	6.50	6.9	11,336
	LR-67-01-813A	06/12/97	880	462	1,880.0	84.60	3,950	2,723	6.50	6.9	11,376
		08/19/97	889	441	1,900.0	91.60	4,200	2,955	5.10	5.7	11,972
		12/17/97	843	432	2,446.0	114.80	3,750	2,862	7.50	6.7	11,764
	LR-67-01-813B	06/12/97	874	463	1,920.0	87.40	4,050	2,792	6.50	6.8	11,380
		08/19/97	872	451	1,900.0	91.60	4,100	2,817	5.10	6.6	12,152
		12/17/97	837	425	2,496.0	115.30	3,650	2,862	6.25	6.6	11,536
	LR-67-01-814A	06/12/97	883	462	1,870.0	84.60	4,000	2,735	6.25	7.0	11,732
		08/19/97	860	452	1,880.0	92.10	4,250	2,791	5.70	4.2	11,952
		12/17/97	843	426	2,488.0	117.60	3,500	2,872	6.50	7.1	11,848
	LR-67-01-814B	06/12/97	862	462	1,970.0	83.60	4,000	2,713	7.25	6.5	12,844
		08/19/97	858	444	1,880.0	92.10	4,150	2,814	5.90	6.3	11,816
		12/17/97	844	418	2,383.0	117.60	3,600	2,860	6.50	7.5	11,672
	LR-67-01-819	08/28/97	92	16	11.0	1.20	17	21	0.20	12.0	332
	LR-67-01-820	08/28/97	88	19	11.0	1.40	20	24	0.21	11.0	334
	LR067-09-106	06/10/97	87	16	12.0	1.30	20	27	0.19	12.0	332
Medina											
	TD-68-33-502	07/15/97	66	17	7.2	1.30	11	41	0.19	11.0	276
	TD-68-42-111	07/10/97	67	15	9.8	1.10	21	14	0.19	12.0	275
	TD-68-42-506	07/16/97	68	16	9.9	1.00	22	14	0.20	12.0	272
	TD-68-49-201	07/17/97	64	16	11.0	1.10	23	18	0.22	12.0	272

Analytical data for major ions in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids (mg/L)
	TD-68-49-301	07/17/97	55	19	8.4	0.96	17	24	0.67	13.0	262
	TD-69-39-905	07/09/97	100	5.8	29.0	2.00	25	19	0.17	16.0	398
	TD-69-40-403	07/08/97	75	10	5.5	0.99	10	8	0.13	12.0	261
	TD-69-46-601	08/20/97	68	15	7.3	1.00	13	17	0.20	12.0	264
	TD-69-47-303	07/08/97	64	16	7.8	0.98	14	17	0.21	12.0	261
	TD-69-47-604	07/16/97	72	15	11.0	1.10	22	17	0.15	12.0	280
	TD-69-47-702	07/14/97	67	14	11.0	1.20	25	16	0.16	12.0	268
	TD-69-55-606	07/15/97	76	15	11.0	1.00	28	15	0.17	12.0	293
Uvalde											
	YO-69-45-405	08/14/97	70	14	7.2	1.00	12	16	0.23	12.0	264
	YP-69-43-303	08/19/97	63	14	7.3	1.10	18	12	<0.10	12.0	246
	YP-69-43-606	08/18/97	80	11	11.0	1.10	23	15	0.11	12.0	290
	YP-69-45-102	08/19/97	50	24	7.4	1.10	12	26	0.50	12.0	257
	YP-69-45-401	08/11/97	72	14	8.9	1.10	15	21	0.18	12.0	276
	YP-69-50-340	08/13/97	83	8.4	12.0	0.94	26	15	0.15	12.0	292
	YP-69-50-501	08/13/97	150	17	55.0	1.30	180	79	0.19	15.0	661

Analytical data for minor elements in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Arsenic, dissolved (mg/L)	Barium, dissolved (mg/L)	Cadmium, dissolved (mg/L)	Chromium, dissolved (mg/L)	Copper, dissolved (mg/L)	Iron, dissolved (mg/L)	Lead, dissolved (mg/L)	Manganese, dissolved (mg/L)	Mercury, dissolved (mg/L)	Selenium, dissolved (mg/L)	Silver, dissolved (mg/L)	Zinc, dissolve (mg/L)
Bexar														
	AY-68-28-904	07/07/97						<3.0		<1.0				
	AY-68-29-920	06/12/97						<3.0		<1.0				
	AY-68-30-109	06/23/97												
	AY-68-36-503	06/26/97						<3.0		<1.0				
	AY-68-36-613	07/09/97						<3.0		<1.0				
	AY-68-36-614	07/09/97						<3.0		1.3				
	AY-68-37-304	06/25/97						<3.0		<1.0				
	AY-68-37-521	01/29/97												
		02/25/97												
		03/27/97												
		04/28/97												
		05/22/97	<0.002	<0.01	<0.001	0.002	0.001	0.051	<0.002	0.009	<0.002	0.007	<0.001	<0.01
		07/28/97	0.003	0.01	<0.001	<0.002	0.002	0.085	<0.002	0.012	<0.002	0.005	<0.001	<0.01
		08/27/97	<0.002	0.02	<0.001	<0.002	0.002	0.055	<0.002	0.018	<0.002	<0.002	<0.001	<0.01
		09/30/97												
		10/29/97												
		11/25/97												
		12/18/97	0.003	0.01	<0.001	<0.002	0.002	0.066	<0.002	0.012	<0.002	0.006	<0.001	<0.01
	AY-68-37-522	01/29/97												
		02/25/97												
		03/27/97												
		04/28/97												
		05/22/97	<0.002	<0.01	<0.001	<0.002	0.001	0.071	0.003	0.011	<0.002	<0.002	<0.001	<0.01
		07/28/97	0.003	<0.01	<0.001	<0.002	<0.001	0.047	<0.002	0.011	<0.002	<0.002	<0.001	<0.01
		08/27/97	<0.002	0.01	<0.001	<0.002	0.002	0.040	0.002	0.014	<0.002	0.003	<0.001	<0.01
		09/30/97												
		10/29/97												
		11/25/97												
		12/18/97	<0.002	0.01	<0.001	<0.002	0.001	0.061	<0.002	0.012	<0.002	<0.002	<0.001	<0.01
Bexar	AY-68-37-523	01/29/97												
		02/25/97												
		03/27/97												
		04/28/97												
		05/22/97	<0.002	<0.01	<0.001	<0.002	0.001	0.031	<0.002	0.013	<0.002	0.003	<0.001	<0.01
		07/28/97	0.006	<0.01	<0.001	<0.002	<0.001	0.052	0.002	0.010	<0.002	0.004	<0.001	<0.01
		08/27/97	<0.002	0.01	<0.001	<0.002	<0.001	0.026	<0.002	0.017	<0.002	<0.002	<0.001	<0.01
		09/30/97												
		10/29/97												
		11/25/97												

Analytical data for minor elements in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Arsenic, dissolved (mg/L)	Barium, dissolved (mg/L)	Cadmium, dissolved (mg/L)	Chromium, dissolved (mg/L)	Copper, dissolved (mg/L)	Iron, dissolved (mg/L)	Lead, dissolved (mg/L)	Manganese, dissolved (mg/L)	Mercury, dissolved (mg/L)	Selenium, dissolved (mg/L)	Silver, dissolved (mg/L)	Zinc, dissolve (mg/L)
		12/18/97	0.003	<0.01	<0.001	<0.002	0.004	0.040	<0.002	0.012	<0.002	0.003	<0.001	<0.01
	AY-68-37-524	01/29/97												
		02/25/97												
		03/27/97												
		04/28/97												
		05/22/97	0.007	0.05	<0.001	<0.002	<0.001	1.347	0.003	0.009	<0.002	<0.002	<0.001	<0.01
		07/28/97	0.008	0.05	<0.001	<0.002	0.007	1.282	<0.002	0.009	<0.002	<0.002	<0.001	<0.01
		08/27/97	0.011	0.06	<0.001	<0.002	<0.001	0.721	<0.002	0.009	<0.002	<0.002	<0.001	<0.01
		09/30/97												
		10/29/97												
		11/25/97												
		12/18/97	0.008	0.06	<0.001	<0.002	0.002	1.250	<0.002	0.009	<0.002	<0.002	<0.001	<0.01
	AY-68-37-525	01/29/97												
		02/25/97												
		03/27/97												
		04/28/97												
		05/22/97	<0.002	<0.01	<0.001	<0.002	0.001	0.067	<0.002	0.019	<0.002	<0.002	<0.001	<0.01
		07/28/97	<0.002	0.01	<0.001	<0.002	<0.001	0.098	<0.002	0.015	<0.002	0.003	<0.001	<0.01
		08/27/97	0.063	0.02	<0.001	<0.002	0.002	0.039	<0.002	0.022	<0.002	<0.002	<0.001	<0.01
		09/30/97												
		10/29/97												
		11/25/97												
		12/18/97	<0.002	0.02	<0.001	<0.002	0.002	0.034	<0.002	0.014	<0.002	0.003	<0.001	<0.01
Bexar	AY-68-37-526	01/30/97												
		02/28/97												
		03/27/97												
		04/28/97												
		05/22/97	<0.002	0.10	<0.001	<0.002	<0.001	0.465	0.003	0.017	<0.002	<0.002	<0.001	<0.01
		07/28/97	0.002	0.10	<0.001	<0.002	<0.001	0.537	<0.002	0.011	<0.002	0.003	<0.001	0.01
		08/27/97	<0.002	0.11	<0.001	<0.002	<0.001	0.241	<0.002	0.011	<0.002	<0.002	<0.001	0.01
		09/30/97												
		10/29/97												
		11/25/97												
		12/18/97	<0.002	0.10	<0.001	<0.002	0.002	0.560	<0.002	0.015	<0.002	<0.002	<0.001	<0.01
	AY-68-37-527	01/30/97												
		02/28/97												
		03/27/97												
		04/28/97												
		05/22/97	<0.002	0.11	<0.001	<0.002	<0 001	0.017	0.003	0.003	<0.002	0.005	0.001	<0.01
		07/28/97	<0.002	0.10	<0.001	<0.002	<0.001	0.009	<0.002	0.004	<0.002	<0.002	<0.001	<0.01

Analytical data for minor elements in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Arsenic, dissolved (mg/L)	Barium, dissolved (mg/L)	Cadmium, dissolved (mg/L)	Chromium, dissolved (mg/L)	Copper, dissolved (mg/L)	Iron, dissolved (mg/L)	Lead, dissolved (mg/L)	Manganese, dissolved (mg/L)	Mercury, dissolved (mg/L)	Selenium, dissolved (mg/L)	Silver, dissolved (mg/L)	Zinc, dissolve (mg/L)
		08/27/97	<0.002	0.11	<0.001	<0.002	0.004	0.008	<0.002	0.004	<0.002	0.003	<0.001	<0.01
		09/30/97												
		10/29/97												
		11/25/97												
		12/18/97	<0.002	0.11	<0.001	<0.002	0.001	0.01	0.005	0.002	0.005	<0.002	<0.001	<0.01
	AY-68-43-811	06/24/97												
	AY-68-44-217	06/25/97						6.20						
Comal														
	DX-68-15-901	09/17/97	<0.002	0.04	<0.001	<0.001	0.006	0.021	<0.002	0.002	<0.002	<0.002	<0.001	<0.01
	DX-68-23-301	07/31/97						<3.0		<1.0				
	DX-68-23-303	06/11/97												
	DX-68-23-616A	01/28/97												
		02/27/97												
		03/26/97												
		04/30/97												
		07/22/97	<0.002	0.01	<0.001	0.003	0.003	0.038	0.003	0.004	<0.002	0.010	<0.001	<0.01
		08/26/97	<0.002	0.11	<0.001	<0.002	0.004	0.010	<0.002	0.007	<0.002	<0.002	<0.001	<0.01
		09/24/97												
		10/30/97												
		12/19/97	<0.002	0.03	<0.001	<0.001	<0.001	0.068	0.001	0.004	<0.002	0.007	<0.001	0.01
	DX-68-23-616B	01/28/97												
		02/27/97												
		03/26/97												
		04/30/97												
		07/22/97	<0.002	0.01	<0.001	<0.002	0.002	0.016	0.002	0.004	<0.002	<0.002	<0.001	<0.01
		08/26/97	<0.002	0.03	<0.001	<0.002	0.006	0.029	<0.002	0.002	<0.002	<0.002	<0.001	<0.01
		09/24/97												
		10/30/97												
		12/19/97	<0.002	0.03	<0.001	<0.001	0.001	0.013	0.002	0.003	<0.002	0.006	<0.001	0.01
	DX-68-23-617	01/28/97												
		02/27/97												
		03/26/97												
		04/30/97												
		07/22/97	0.002	0.10	<0.001	<0.002	0.010	0.010	<0.002	0.001	<0.002	<0.002	<0.001	<0.01
		08/26/97	<0.002	0.03	<0.001	<0.002	0.003	0.024	<0.002	0.004	<0.002	<0.002	<0.001	<0.01
		09/24/97												
		10/30/97												
		12/19/97	<0.002	0.11	<0.001	<0.001	<0.001	0.011	0.01	0.005	<0.002	<0.002	<0.001	0.01
	DX-68-23-618	01/28/97												
		02/27/97												

Analytical data for minor elements in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Arsenic, dissolved (mg/L)	Barium, dissolved (mg/L)	Cadmium, dissolved (mg/L)	Chromium, dissolved (mg/L)	Copper, dissolved (mg/L)	Iron, dissolved (mg/L)	Lead, dissolved (mg/L)	Manganese, dissolved (mg/L)	Mercury, dissolved (mg/L)	Selenium, dissolved (mg/L)	Silver, dissolved (mg/L)	Zinc, dissolve (mg/L)
		03/26/97												
		04/30/97												
		07/22/97	<0.002	0.02	<0.001	<0.002	<0.001	0.036	<0.002	0.001	<0.002	0.004	<0.001	<0.01
		08/26/97	<0.002	0.02	<0.001	<0.002	0.005	0.008	<0.002	0.003	<0.002	<0.002	<0.001	<0.01
		09/24/97												
		10/30/97												
		12/19/97	<0.002	0.03	<0.001	<0.001	0.002	0.043	<0.001	<0.002	<0.002	0.007	<0.001	0.01
	DX-68-23-619A	01/28/97												
		02/27/97												
		03/26/97												
		04/30/97												
		07/22/97	<0.002	0.03	<0.001	<0.002	<0.001	0.079	<0.002	0.002	<0.002	0.003	<0.001	<0.01
		08/26/97	<0.002	0.03	<0.001	<0.002	0.003	0.056	<0.002	0.004	<0.002	0.003	<0.001	<0.01
		09/24/97												
		10/30/97												
		12/19/97	<0.002	0.05	<0.001	<0.001	<0.001	0.335	0.001	0.022	<0.002	0.015	<0.001	0.01
	DX-68-23-619B	01/28/97												
		02/27/97												
		03/26/97												
		04/30/97												
		07/22/97	0.002	0.11	<0.001	<0.002	0.001	0.039	<0.002	0.002	<0.002	<0.002	<0.001	<0.01
		08/26/97	<0.002	0.13	<0.001	<0.002	0.003	0.022	<0.002	0.003	<0.002	<0.002	<0.001	<0.01
		09/24/97												
		10/30/97												
		12/19/97	<0.002	0.12	<0.001	<0.001	0.001	0.079	<0.001	<0.002	<0.002	0.017	<0.001	0.02
Hays														
	LR-67-01-812	06/12/97	0.012	<0.01	<0.001	<0.002	<0.001	0.023	<0.002	0.004	<0.002	<0.002	0.002	<0.01
		08/19/97	<0.002	<0.01	<0.001	<0.002	0.002	0.054	<0.002	0.005	<0.002	0.005	<0.001	<0.01
		12/17/97	0.008	<0.01	<0.001	<0.002	0.003	0.022	<0.002	0.004	<0.002	0.003	<0.001	<0.01
	LR-67-01-813A	06/12/97	0.011	0.01	<0.001	<0.002	<0.001	0.012	0.003	0.008	<0.002	0.004	0.002	0.01
		08/19/97	0.002	<0.01	<0.001	<0.002	<0.001	0.018	<0.002	0.007	<0.002	0.005	<0.001	0.01
		12/17/97	0.007	<0.01	<0.001	<0.002	0.007	0.011	<0.002	0.006	<0.002	0.007	<0.001	<0.01
	LR-67-01-813B	06/12/97	0.011	<0.01	0.001	<0.002	<0.001	0.009	<0.002	0.004	<0.002	<0.002	0.002	<0.01
		08/19/97	<0.002	<0.01	<0.001	<0.002	<0.001	0.010	<0.002	0.004	<0.002	0.003	<0.001	<0.01
		12/17/97	0.005	<0.01	<0.001	<0.002	0.010	0.012	<0.002	0.003	<0.002	0.005	<0.001	<0.01
	LR-67-01-814A	06/12/97	0.008	0.01	<0.001	<0.002	<0.001	0.015	<0.002	0.004	<0.002	<0.002	0.002	<0.01
		08/19/97	0.006	<0.01	<0.001	0.01	<0.001	0.017	<0.002	0.004	<0.002	0.003	<0.001	<0.01
		12/17/97	0.004	<0.01	<0.001	<0.002	0.008	0.014	<0.002	0.004	<0.002	0.008	<0.001	<0.01
	LR-67-01-814B	06/12/97	0.009	<0.01	<0.001	<0.002	<0.001	0.014	<0.002	0.004	<0.002	<0.002	0.002	0.01
		08/19/97	0.002	<0.01	<0.001	<0.002	0.002	0.018	<0.002	0.004	<0.002	0.009	<0.001	<0.01

Analytical data for minor elements in water from wells completed in the Edwards Aquifer, 1997.

County	State well number	Date sampled	Arsenic, dissolved (mg/L)	Barium, dissolved (mg/L)	Cadmium, dissolved (mg/L)	Chromium, dissolved (mg/L)	Copper, dissolved (mg/L)	Iron, dissolved (mg/L)	Lead, dissolved (mg/L)	Manganese, dissolved (mg/L)	Mercury, dissolved (mg/L)	Selenium, dissolved (mg/L)	Silver, dissolved (mg/L)	Zinc, dissolve (mg/L)
		12/17/97	0.004	<0.01	<0.001	<0.002	0.005	0.016	<0.002	0.004	<0.002	0.004	<0.001	<0.01
	LR-67-01-819	08/28/97						19		<1.0				
	LR-67-01-820	08/28/97						<3.0		<1.0				
	LR067-09-106	06/10/97						<3.0		<1.0				
Medina														
	TD-68-33-502	07/15/97						<3.0		<1.0				
	TD-68-42-111	07/10/97						<3.0		<1.0				
	TD-68-42-506	07/16/97						<3.0		<1.0				
	TD-68-49-201	07/17/97						<3.0		<1.0				
	TD-68-49-301	07/17/97						<3.0		<1.0				
	TD-69-39-905	07/09/97						<3.0		<1.0				
	TD-69-40-403	07/08/97						<3.0		<1.0				
	TD-69-46-601	08/20/97						<3.0		<1.0				
	TD-69-47-303	07/08/97						<3.0		<1.0				
	TD-69-47-604	07/16/97						<3.0		<1.0				
	TD-69-47-702	07/14/97						9.6		<1.0				
	TD-69-55-606	07/15/97						<3.0		<1.0				
Uvalde														
	YP-69-45-405	08/14/97						<3.0		<1.0				
	YP-69-43-303	08/19/97						5.3		<1.0				
	YP-69-43-606	08/18/97						<3.0		<1.0				
	YP-69-45-102	08/19/97						<3.0		<1.0				
	YP-69-45-401	08/11/97						<3.0		<1.0				
	YP-69-50-340	08/13/97						<3.0		<1.0				
	YP-69-50-501	08/13/97						12		<1.0				

Analytical data for selected properties and common inorganic constituents in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer 1997.

Station name	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids
Blanco River @ Wimberley, Tx.	03/26/97	73	16	8.0	1.2	14	27	0.20	8.2	266
Blanco River @ Wimberley, Tx.	07/17/97	64	16	7.4	1.2	11	22	0.20	9.7	232
Comal River @ New Braunfels, Tx.	03/26/97	81	16	10	1.3	17	25	0.30	12	289
Comal River @ New Braunfels, Tx.	07/17/97	77	16	10	1.3	16	24	0.20	12	273
Dry Frio River near Reagan Wells, Tx.	03/19/97	64	13	6.0	<1	14	20	0.15	4.4	236
Dry Frio River near Reagan Wells, Tx.	07/16/97	59	13	7.2	1.1	14	19	0.15	5.0	248
Dry Frio River near Reagan Wells, Tx.	12/11/97	53	12	10.9	<1	13	16	0.19	4.2	172
Frio River @ Concan, Tx.	03/19/97	60	13	6.2	0.80	10	15	0.20	10	226
Frio River @ Concan, Tx.	07/16/97	64	15	7.2	1	11	15	0.10	12	226
Hondo Creek near Tarpley, Tx.	03/19/97	65	11	5.0	<1	13	44	0.22	4.2	244
Hondo Creek near Tarpley, Tx.	07/30/97	62	10	8.3	<1	15	32	0.25	5.8	248
Hondo Creek near Tarpley, Tx.	12/16/97	50	12	13.2	<1	15	47	0.25	5.5	236
Medina River @ Bandera, Tx.	03/18/97	70	18	6.0	<1	14	60	0.28	4.6	284
Medina River @ Bandera, Tx.	07/30/97	75	20	7.8	<1	15	77	0.35	5.5	384
Medina River @ Bandera, Tx.	12/16/97	63	20	10.9	<1	14	87	0.28	5.1	348

Analytical data for selected properties and common inorganic constituents in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer 1997.

Station name	Date sampled	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Chloride, dissolved (mg/L)	Sulfate, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Total dissolved solids
Nueces River @ Laguna, Tx.	03/19/97	58	14	7.0	<1	16	17	0.18	5.2	212
Nueces River @ Laguna, Tx.	07/17/97	65	15	9.3	1.1	18	21	0.18	5.6	268
Nueces River @ Laguna, Tx.	12/10/97	55	14	8.4	<1	18	17	0.27	5.7	300
Sabinal River near Sabinal, Tx.	03/19/97	70	12	6.5	1.0	11	30	0.20	10	252
Sabinal River near Sabinal, Tx.	07/16/97	73	13	7.9	1.0	11	22	0.20	13	243
Seco Creek @ Miller Ranch, near Utopia, Tx.	03/19/97	66	12	5.7	<1	20	46	0.21	4.9	240
Seco Creek @ Miller Ranch, near Utopia, Tx.	07/16/97	63	10	7.4	1.1	14	35	0.23	6.2	256
Seco Creek @ Miller Ranch, near Utopia, Tx.	12/11/97	52	11	11.3	<1	14	47	0.32	5.3	198

Analytical data for minor elements in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer, 1997.

Station name	Date sampled	As, diss* (mg/L)	Ba, diss* (mg/L)	Cd, diss* (mg/L)	Cr, diss* (mg/L)	Cu, diss* (mg/L)	Fe, diss* (mg/L)	Pb, diss* (mg/L)	Mn, diss* (mg/L)	Hg, diss* (mg/L)	Se, diss* (mg/L)	Ag, diss* (mg/L)	Zn, diss* (mg/L)	BOD 5	Nitrogen, Kjeldahl (mg/L)	Nitrogen, nitrate (mg/L)	Nitrogen, nitrite (mg/L)	Phosphorus, total (mg/L)	Total organic carbon (mg/L)	Total suspended solids (mg/L)
Blanco River @ Wimberley, Tx.	03/26/97						<3.0		2.0						0.70		<0.010	0.070	1.4	12
Blanco River @ Wimberley, Tx.	07/17/97						<3.0		<1.0						<0.2		<0.01	<0.01	<1.3	11
Comal River @ New Braunfels, Tx.	03/26/97														<0.20		<0.010	<0.010	0.4	4
Comal River @ New Braunfels, Tx.	07/17/97						<3.0		<1.0						<0.2		<0.01	<0.01	<0.6	11
Dry Frio River near Reagan Wells, Tx.	03/19/97	<0.002	0.03	<0.001	<0.002	<0.002	<0.003	<0.002	<0.002	<0.002	<0.002	<0.001	0.01	<1	0.28	1.38	<0.005	0.01	1.4	<1
Dry Frio River near Reagan Wells, Tx.	07/16/97	<0.002	0.046	<0.001	<0.002	<0.001	0.004	<0.002	0.002	<0.002	<0.002	<0.001	0.01	<1	0.4	0.72	<0.005	<0.02	1.1	1
Dry Frio River near Reagan Wells, Tx.	12/11/97	<0.002	0.03	<0.001	<0.002	0.002	0.006	<0.002	<0.001	<0.002	<0.003	<0.001	<0.01	<1	0.28	0.74	<0.005	<0.01	<1.0	<1
Frio River @ Concan,Tx.	03/19/97						<3.0		<1.0						<0.20		<0.010	<0.010	1.2	3
Frio River @ Concan,Tx.	07/16/97						<3.0		<1.0						<0.2		<0.01	<0.01	<1.3	7
Hondo Creek near Tarpley, Tx.	03/19/97	<0.002	0.02	<0.001	<0.002	0.003	0.009	<0.002	<0.002	<0.002	<0.002	<0.001	<0.01	<1	0.65	0.49	<0.005	0.01	1.9	2
Hondo Creek near Tarpley, Tx.	07/30/97	<0.002	0.03	<0.001	<0.002	0.002	0.005	<0.001	0.001	<0.002	0.002	<0.001	<0.01	<1	0.5	0.42	0.005	<0.01	1.2	<1
Hondo Creek near Tarpley, Tx.	12/16/97	0.002	0.03	<0.001	<0.002	0.002	0.008	<0.002	0.019	<0.002	0.003	<0.001	<0.01	<1	2.23	0.16	<0.005	<0.01	2.3	<1

Analytical data for minor elements in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer, 1997.

Station name	Date sampled	As, diss* (mg/L)	Ba, diss* (mg/L)	Cd, diss* (mg/L)	Cr, diss* (mg/L)	Cu, diss* (mg/L)	Fe, diss* (mg/L)	Pb, diss* (mg/L)	Mn, diss* (mg/L)	Hg, diss* (mg/L)	Se, diss* (mg/L)	Ag, diss* (mg/L)	Zn, diss* (mg/L)	BOD 5	Nitrogen, Kjeldahl (mg/L)	Nitrogen, nitrate (mg/L)	Nitrogen, nitrite (mg/L)	Phosphorus, total (mg/L)	Total organic carbon (mg/L)	Total suspended solids (mg/L)
Medina River @ Bandera, Tx.	03/18/97	<0.002	0.02	<0.001	<0.002	<0.002	<0.003	<0.002	<0.002	<0.002	<0.002	<0.001	<0.01	<1	0.46	0.62	<0.005	0.03	1.8	4
Medina River @ Bandera, Tx.	07/30/97	<0.002	0.04	<0.001	<0.002	0.001	0.008	0.002	0.002	<0.002	<0.002	<0.001	<0.01	<1	0.4	0.68	0.006	<0.01	1.0	<1
Medina River @ Bandera, Tx.	12/16/97	<0.002	0.03	<0.001	<0.002	0.006	0.011	<0.002	0.009	<0.002	<0.003	<0.001	<0.01	<1	0.38	0.26	<0.005	<0.01	2.4	<1
Nueces River @ Laguna, Tx.	03/19/97	<0.002	0.03	<0.001	<0.002	<0.002	<0.003	<0.002	<0.002	<0.002	<0.002	<0.001	<0.01	<1	0.28	1.78	<0.005	0.18	1.3	<1
Nueces River @ Laguna, Tx.	12/10/97	<0.002	0.03	<0.001	<0.002	0.022	0.006	<0.002	<0.001	<0.002	<0.003	<0.001	<0.01	<1	0.37	0.89	<0.005	0.17	<1.0	<1
Nueces River @ Laguna, Tx.	07/17/97	<0.002	0.053	<0.001	<0.002	0.004	<0.003	0.004	<0.001	<0.002	<0.002	<0.001	0.01	<1	0.6	1.63	<0.005	<0.02	1.0	2
Sabinal River near Sabinal, Tx.	03/19/97						<3.0		2.0						<0.20		<0.010	<0.010	1.1	4
Sabinal River near Sabinal, Tx.	07/16/97						3.0		<1.0						<0.2		<0.01	<0.01	<1.1	15
Seco Creek @ Miller Ranch near Utopia, Tx.	07/16/97	<0.002	0.037	<0.001	<0.002	0.002	0.003	<0.002	0.002	<0.002	<0.002	<0.001	0.01	<1	0.5	0.45	0.007	<0.02	<1.0	102
Seco Creek @ Miller Ranch near Utopia, Tx.	12/11/97	<0.002	0.02	<0.001	<0.002	<0.001	0.015	<0.002	<0.001	<0.002	<0.003	<0.001	<0.01	<1	0.56	0.13	<0.005	0.01	<1.0	2
Seco Creek @ Miller Ranch near Utopia, Tx.	03/19/97	<0.002	0.02	<0.001	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.001	<0.01	<1	0.37	0.59	<0.005	0.01	1.0	2

diss* = dissolved

Analytical data for pesticides and herbicides in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer, 1997.

Station name	Date Sampled	Aldrin (µg/L)	Gamma BHC (Lindane) (µg/L)	Chlordane (µg/L)	4,4' - DDD (µg/L)	4,4' -DDE (µg/L)	4,4' - DDT (µg/L)	Dieldrin (µg/L)	Endosulfan I (Alpha) (µg/L)	Endosulfan II (Beta) (µg/L)
Dry Frio River near Reagan Wells, Tx.	03/19/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dry Frio River near Reagan Wells, Tx.	07/16/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dry Frio River near Reagan Wells, Tx.	12/11/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DX-68-15-901 (Hueco Springs)	09/17/97	<0.01	0.02	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	03/19/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01
Hondo Creek near Tarpley, Tx	07/30/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	12/16/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	03/18/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01
Medina River @ Bandera, Tx.	07/30/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	12/16/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	03/19/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	12/10/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	07/17/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	03/19/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	07/16/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	12/11/97	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical data for pesticides and herbicides in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer, 1997.

Station name	Endrin (µg/L)	Heptachlor (µg/L)	Heptachlor Epoxide (µg/L)	Mirex (µg/L)	Perthane (µg/L)	Toxaphene (µg/L)	PCB-1016 (µg/L)	PCB-1221 (µg/L)	PCB-1232 (µg/L)	PCB-1242 (µg/L)	PCB-1248 (µg/L)	PCB-1254 (µg/L)
Dry Frio River near Reagan Wells, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dry Frio River near Reagan Wells, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dry Frio River near Reagan Wells, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
DX-68-15-901 (Hueco Springs)	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Hondo Creek near Tarpley, Tx	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Hondo Creek near Tarpley, Tx	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Hondo Creek near Tarpley, Tx	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Medina River @ Bandera, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Medina River @ Bandera, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Medina River @ Bandera, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nueces River @ Laguna, TX	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nueces River @ Laguna, TX	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nueces River @ Laguna, TX	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.01	<0.01	<0.01	<0.01	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

Analytical data for pesticides and herbicides in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer, 1997.

Station name	PCB-1260 (µg/L)	Halowax 1000 (µg/L)	Halowax 1001 (µg/L)	Halowax 1013 (µg/L)	Halowax 1014 (µg/L)	Halowax 1051 (µg/L)	Halowax 1099 (µg/L)	Diazinon (µg/L)	Ethion (µg/L)	Malathion (µg/L)
Dry Frio River near Reagan Wells, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Dry Frio River near Reagan Wells, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Dry Frio River near Reagan Wells, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
DX-68-15-901 (Hueco Springs)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.01	<0.01	<0.01

Analytical data for pesticides and herbicides in water from streams crossing the Edwards Aquifer Recharge Zone and springs discharging from the Edwards Aquifer, 1997.

Station name	Methyl Parathion (µg/L)	Parathion (µg/L)	Trithion (µg/L)	2,4-D (µg/L)	2,4,5-T (µg/L)	2,4,5-TP (Silvex) (µg/L)
Dry Frio River near Reagan Wells, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dry Frio River near Reagan Wells, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dry Frio River near Reagan Wells, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DX-68-15-901 (Hueco Springs)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.6
Hondo Creek near Tarpley, Tx	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hondo Creek near Tarpley, Tx	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Medina River @ Bandera, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nueces River @ Laguna, TX	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Seco Creek @ Miller Ranch near Utopia, Tx.	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

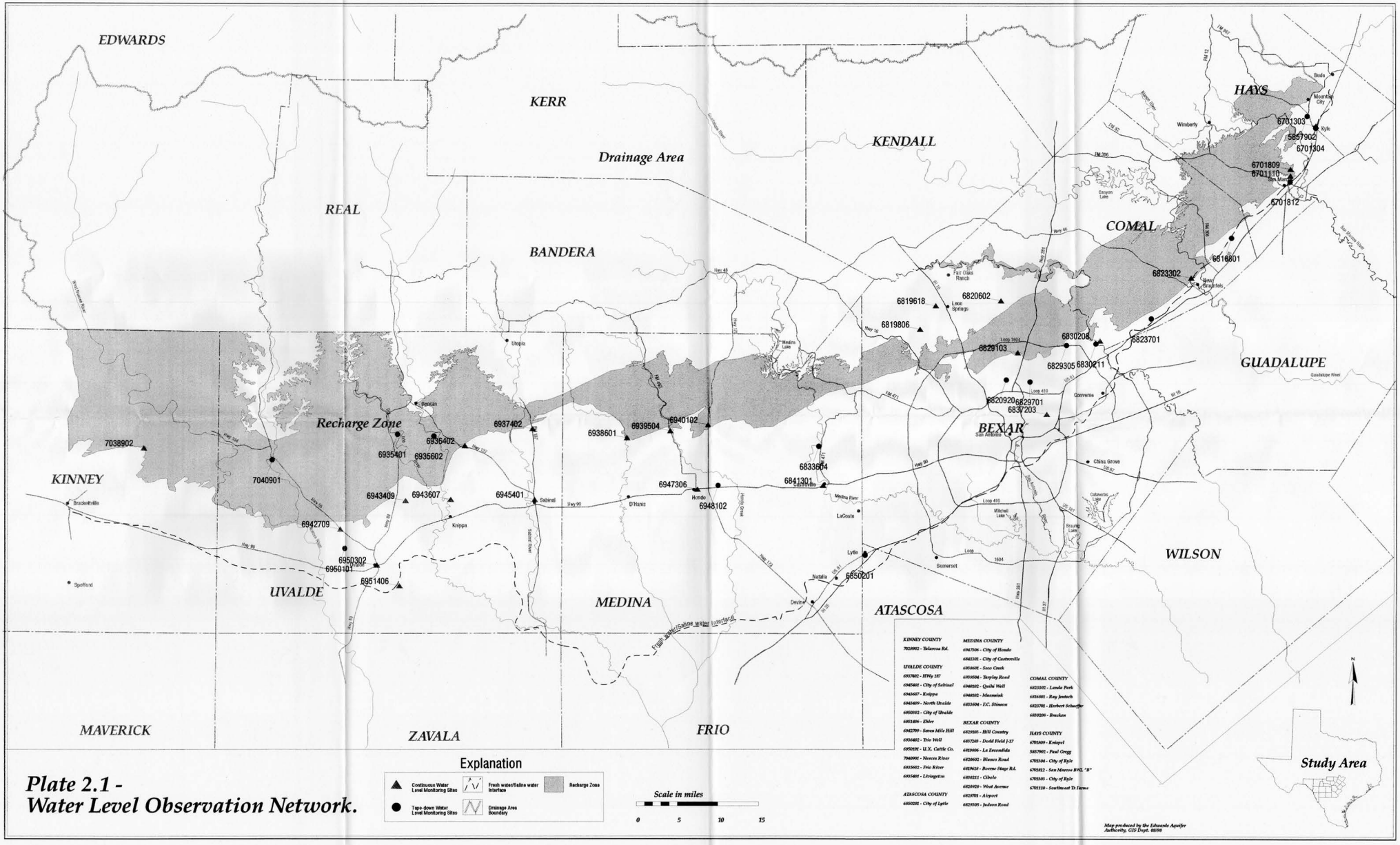


Plate 2.1 - Water Level Observation Network.

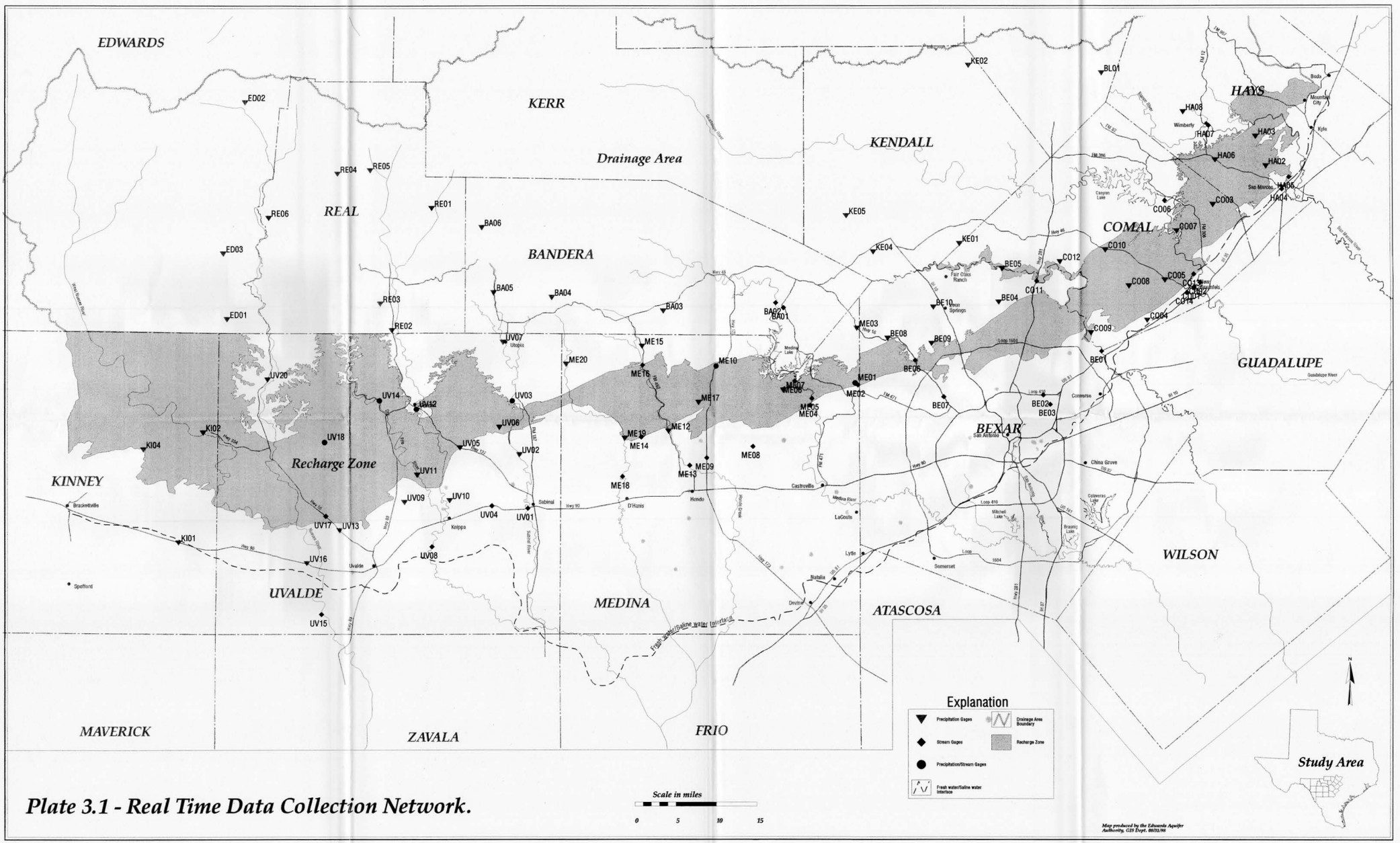


Plate 3.1 - Real Time Data Collection Network.

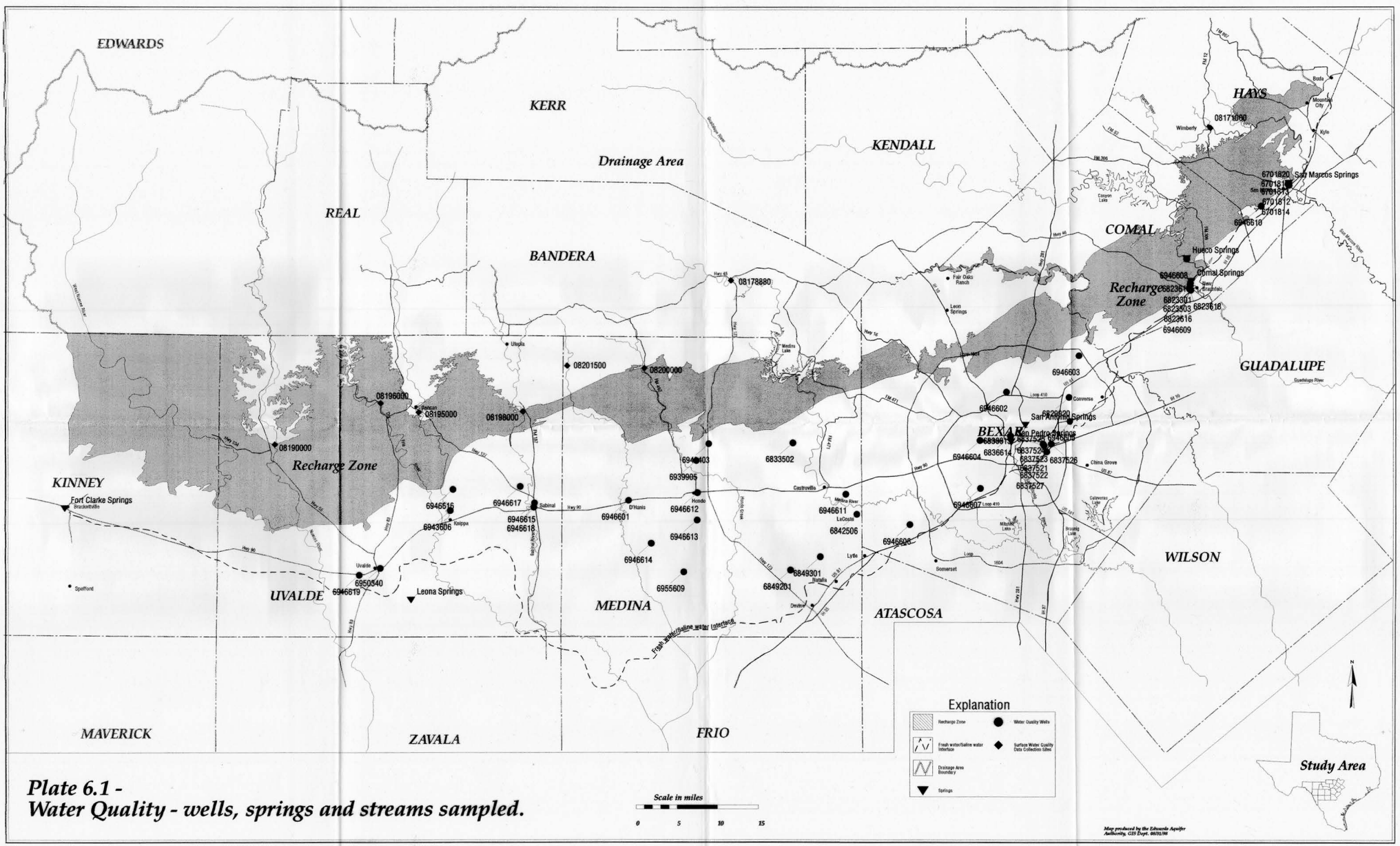


Plate 6.1 -
Water Quality - wells, springs and streams sampled.