Records of Precipitation, Water Levels and Ground-Water Recharge to the Edwards and Associated Limestones San Antonio Area, Texas, 1972-73

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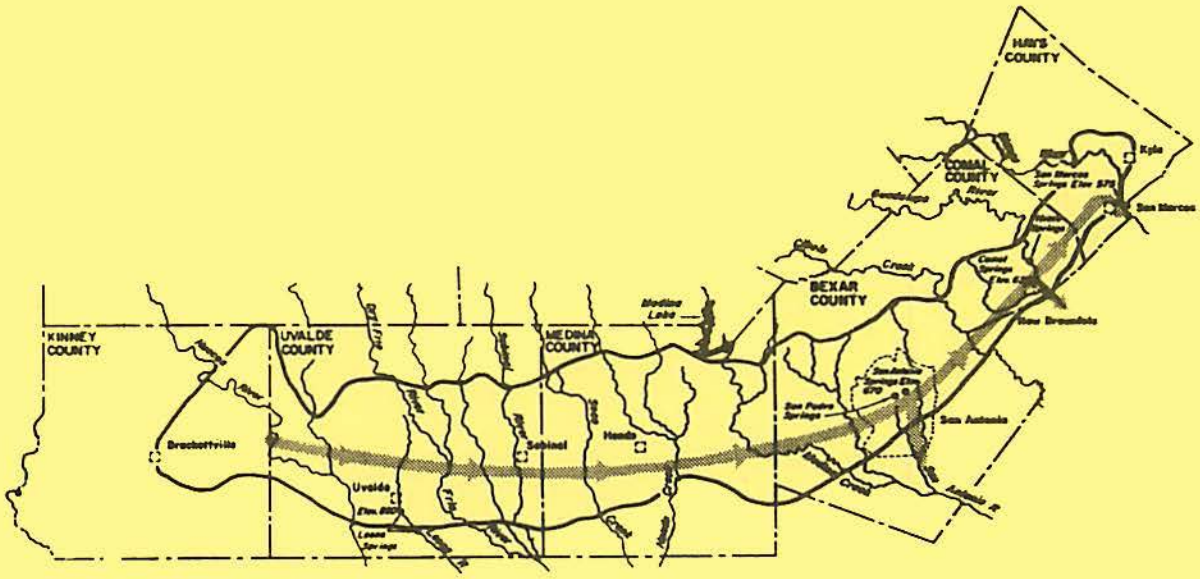

Prepared in cooperation with the U.S. Geological Survey and the Texas Water Development Board

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RECORDS OF PRECIPITATION, WATER LEVELS, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1972-73

Compiled by

Celso Puente
U.S. Geological Survey

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TABLES

RECORDS OF PRECIPITATION, WATER LEVELS, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1972-73

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ABSTRACT

Records of precipitation, water levels, and estimates of recharge to the Edwards and associated limestones in the San Antonio area during 1972-73 are summarized in this report.

Rainfall for 1972 was near average at most of the stations in the San Antonio area. During 1973, a new annual rainfall record of 52.28 inches was recorded at the San Antonio station, and rainfall was well above average at selected stations throughout the area.

Ground-water storage in the Edwards and associated limestones was well above average during 1972-73.

Recharge in 1972 and 1973 was in excess of the average annual recharge. During 1973, the recharge was in excess of the average annual recharge by nearly 955,000 acre-feet, or about 180 percent of the annual average.

INTRODUCTION

Records of precipitation, water levels, and estimates of recharge to the Edwards and associated limestones in the San

Antonio area during 1972-73 are summarized in this report. The compilation of these basic records is part of a continuing hydrologic investigation by the U.S. Geological Survey in cooperation with the Edwards Underground Water District and the Texas Water Development Board. Previous reports are given in the list of references.

The English units used in this report may be converted to metric units by the following conversion factors:

From		Multiply by	To obtain	
Unit	Abbreviation		Unit	Abbreviation
acre-feet	acre-ft	1,233	cubic metres	m^3
inches	in	25.4	millimetres	mm
feet	ft	.3048	metres	m
cubic feet per second	ft^3/s	.02832	cubic metres per second	m^3/s

PRECIPITATION

The annual precipitation at selected stations in the San Antonio area for 1972-73 and the long-term mean precipitation at each of these stations are given in table 1. Annual rainfall during 1972 was near average at most of the stations in the San Antonio area. During 1973, a new annual rainfall record of 52.28 inches was recorded at the San Antonio station, and rainfall was well above average at selected stations throughout the area.

WATER LEVELS

The recorded high and low water levels in five selected key wells during 1972-73 are given in table 2. The water levels fluctuated just below the record high during 1972. During 1973, record-high water levels were recorded in four of the five selected wells. The record highs and lows are given in table 2. Ground-water storage in the Edwards and associated limestones remained well above average during 1972-73.

GROUND-WATER RECHARGE

Recharge to the Edwards and associated limestones is chiefly from streams that lose most of their base flow and part of their flood flow as they cross the Balcones Fault Zone on the outcrop of the aquifer. The recharge is estimated from discharge records at gaging stations located above and below the infiltration areas on most of the streams. Streamflow records for 1972 and January-September 1973 have been published by the U.S. Geological Survey (1972, 1973). The monthly mean discharge at the gaging stations for October-December 1973 is given in table 3.

Table 1.--Precipitation at selected stations in the San Antonio area, 1972-73

Station	Precipitation (inches)		Long-term mean (inches)
	1972	1973	
Brackettville	21.21	30.61	20.83
Uvalde	15.49	30.85	24.11
Sabinal	21.10	37.85	25.85
Hondo	25.43	47.82	28.91
San Antonio	31.49	52.28	28.25
Boerne	35.09	50.93	32.64
New Braunfels	42.02	51.66	31.63
San Marcos	31.90	47.91	33.19

Data from the U.S. Department of Commerce (1972, 1973).

Table 2.--Annual high and low water levels in key wells in the Edwards and associated limestones in the San Antonio area, Texas 1972-73

(feet above mean sea level)

Well	1972 high	1972 low	1973 high	1973 low	Record High	Record Low	Period of Record
YP-69-50-302[a/] H-5-1 (Uvalde Co.)	877.8	874.6	881.7	874.6	881.7 (12-12-73)	811.0 (4-13-57)	1929-32 1934-73
TD-68-41-301[a/] J-1-82 (Medina Co.)	704.6	676.7	731.2	690.0	731.2 (10-31-73)	622.3 (8-18-56)	1950-73
AY-68-37-203[a/] J-17[b/] (Bexar Co.)	679.0	651.2	696.5	665.9	696.5 (10-22-73)	612.5[c/] (8-17-56)	[d/]1932-73
DX-68-23-302[a/] G-49 (Comal Co.)	626.7	624.1	629.8	626.1	629.8 (10-26-73)	613.3 (8-21-56)	1948-73
LR-67-01-304[a/] H-23 (Hays Co.)	579.7	567.3	590.8	572.2	593.8 (3-29-68)	542.2 (7-13-56)	1937-73

a/ New State well number

b/ Replaces well 26 and reflects almost the same water level; composite record of wells 26 and J-17.

c/ Record low for well 26.

d/ Composite record of wells 26 and J-17.

Table 3.--Monthly mean discharge at stream-gaging stations in the San Antonio area, October-December 1973

(Figures rounded to nearest cubic foot per second)

Station	1973		
	Oct.	Nov.	Dec.
West Nueces River near Brackettville	936	31	6
Nueces River at Laguna	2,030	297	196
Nueces River below Uvalde	3,153	334	184
Dry Frio River near Reagan Wells	230	78	41
Frio River at Concan	619	244	161
Frio River below Dry Frio River near Uvalde	434	17	2/
Sabinal River near Sabinal	205	133	88
Sabinal River at Sabinal	135	56	16
Seco Creek at Miller Ranch near Utopia	55	28	14
Seco Creek at Rowe Ranch near D'Hanis 1/	7	0	0
Hondo Creek near Tarpley	129	56	31
Hondo Creek at King Waterhole near Hondo	36	1	2/
Medina River near Pipe Creek	671	306	172
*Medina River near Riomedina	-	-	-
Salado Creek (upper Station) at San Antonio	36	8	5
Cibolo Creek at Selma	304	16	2/
Guadalupe River at Comfort	724	259	188
Guadalupe River near Spring Branch	1,508	627	366
Guadalupe River at Sattler	950	1,177	681
Guadalupe River above Comal River at New Braunfels	1,236	1,307	814
Comal River at New Braunfels	490	455	437
Blanco River at Wimberley	872	297	146
Blanco River near Kyle	1,078	323	145
Plum Creek at Lockhart	394	28	6
San Marcos River springflow at San Marcos	262	279	246

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1/ Formerly Crook Ranch
2/ Less than 0.5.
* Stream-gaging station discontinued September 30, 1973.

The recharge in each basin in the San Antonio area during 1972-73 and the average annual recharge for 1934-71 are given in table 4. The methods described by Petitt and George (1956) and Garza (1962) were used to estimate the 1972-73 recharge.

Total recharge in 1972 and 1973 was in excess of the average annual recharge. During 1973, the recharge was in excess of the average annual recharge by nearly 955,000 acre-feet, or about 180 percent of the annual average. The 1973 annual recharge was the second highest estimated annual recharge since 1934.

Table 4.--Estimated recharge to the Edwards and associated limestones in the San Antonio area, 1972-73 (in thousands of acre-feet)

Basin	1972	1973	1934-71 Average
Nueces and West Nueces Rivers	108.4	190.6	100.8
Frio and Dry Frio Rivers	144.6	256.9	91.2
Sabinal River	49.0	123.9	32.4
Medina Lake	87.9	97.6	51.8
Cibolo and Dry Comal Creeks	104.2	211.7	90.5
Blanco River and adjacent area	33.4	82.2	32.3
Area between Sabinal and Medina Rivers	154.6	286.4	75.2
Area between Cibolo Creek and Medina River	74.3	237.2	57.6
Totals	756.4	1,486.5	531.8

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