

# GAM run 04-17

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Groundwater Availability Modeling Section  
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## **REQUESTOR:**

Katy Hoskins on behalf of the Wes-Tex Groundwater Conservation District.

## **DESCRIPTION OF REQUEST:**

What is the recharge rate for the Edwards-Trinity (Plateau) aquifer within Nolan County?

## **METHODS:**

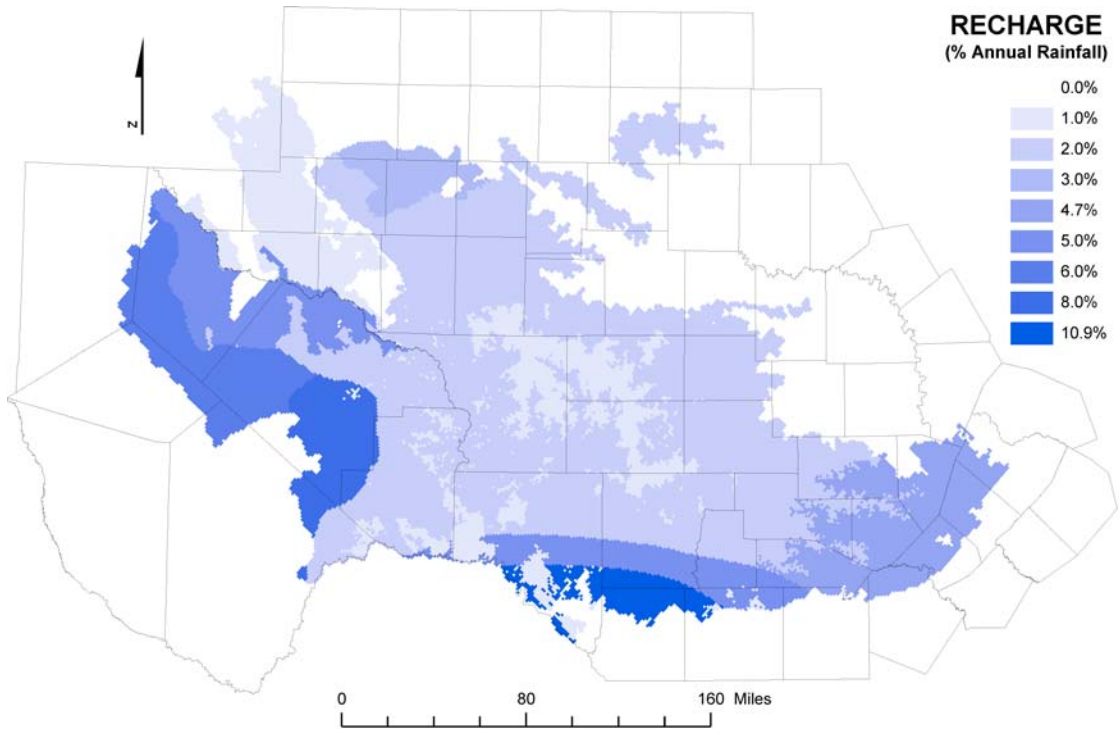
To address the request, we:

- Exported the Geographic Information Systems attribute table used to distribute aquifer recharge for the Edwards-Trinity (Plateau) and Cenozoic Pecos Alluvium Groundwater Availability Model (GAM) into Microsoft Excel.
- Used the Microsoft Excel pivot tables function to summarize average recharge by county as a percentage of annual rainfall.
- Calculated the mean annual recharge for 30-year periods 1961-1990 and 1971-2000 in units of both inches per year and acre-feet per year.

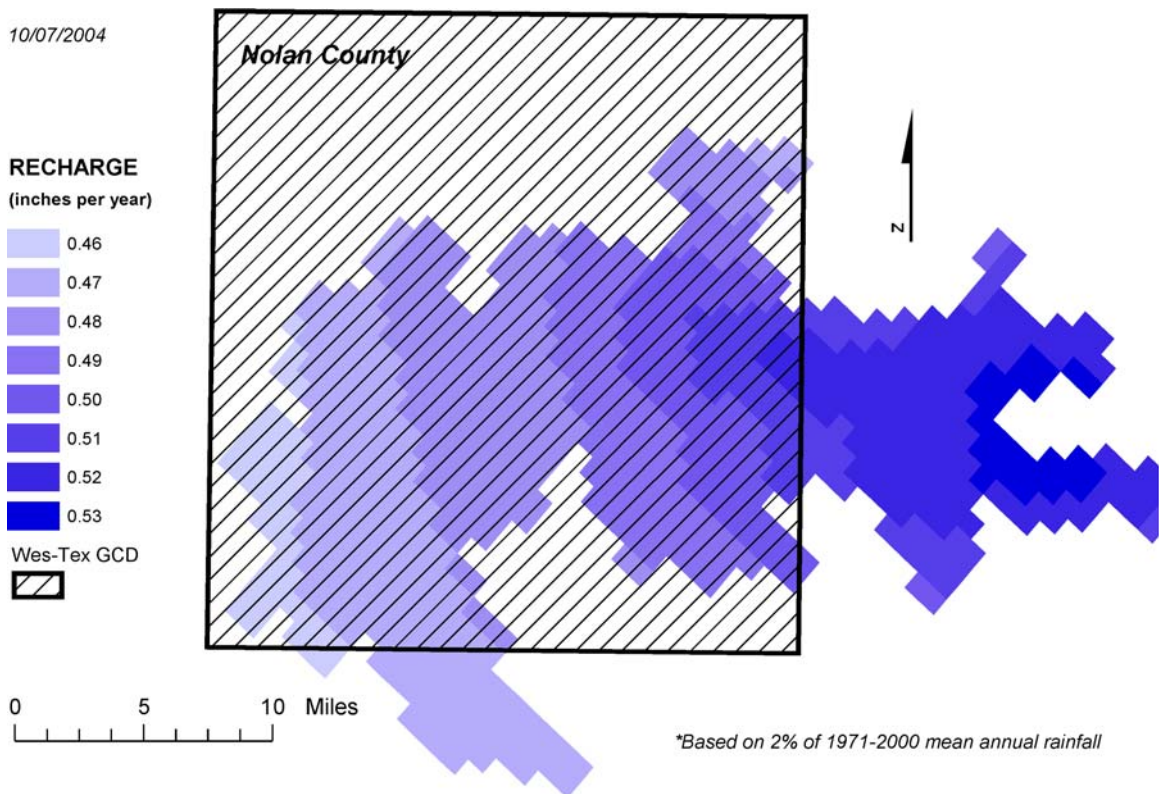
## **PARAMETERS AND ASSUMPTIONS:**

Recharge was calibrated as a percentage of annual rainfall within the model (Figure 1). The GAM used mean annual recharge for the predictive simulations based on mean annual rainfall from 1971 to 2000 (Figure 2). The methodology is discussed in sections 8.1 and 10.0 of the GAM report (Anaya and Jones, 2004).

The results listed in the table GR04-17.xls do not include direct recharge from discrete features such as sinkholes, streams, and lakes. Cross-formational flow from underlying or adjacent aquifer units is not considered as recharge in the table nor is lateral flow within an aquifer unit across county boundaries. In addition, rejected recharge such as evapotranspiration and/or some stream baseflow was not accounted for in the recharge values listed in the table. Consequently, recharge based on water budget analysis from the model may result in different aquifer inflows on a county by county basis.



**Figure 1. Distribution of calibrated recharge as a percentage of mean annual rainfall for active model cells of the Edwards-Trinity (Plateau) and Cenozoic Pecos Alluvium GAM.**



**Figure 2. Distributed recharge for active model cells of the Edwards-Trinity (Plateau) aquifer unit in Nolan and adjacent counties with Wes-Tex Groundwater Conservation District (GCD) boundary.**

## RESULTS

The county recharge rates are listed in the attached table GR04-17.xls. The table lists the total diffuse recharge rates for the Edwards-Trinity (Plateau), Cenozoic Pecos Alluvium, and/or Trinity (Hill Country) aquifer recharge areas that may exist within any of the counties covered by the GAM. Therefore, these recharge values may be used for any county covered by the Edwards-Trinity (Plateau) and Cenozoic Pecos Alluvium GAM.

Unfortunately, the only published recharge estimates for Nolan County are for the Santa Rosa portion of the Dockum aquifer (Shamburger, 1967). Previously published recharge estimates for the Edwards-Trinity (Plateau), Cenozoic Pecos Alluvium, and Trinity (Hill Country) aquifers exist for various counties and regions covered by the GAM. When the GAM calibrated recharge expressed as a percentage of rainfall is used to determine long-term mean annual recharge from 1961 to 1990 or 1971 to 2000 mean annual rainfall, the GAM calibrated mean annual recharge matched well with previous recharge studies. For example, mean annual recharge is 0.9 inches per year in Real County compared to 2.0 inches per year (Long, 1958); 0.3 inches per year in Crockett County compared to 0.3 inches per year (Iglehart, 1967); 0.8 inches per year in Kerr County compared to 1.0 inches per year (Reeves, 1969); 2.6 inches per year in Kinney County compared to 2.5 inches per year (Mace and Anaya, 2004); 1.5 inches per year in the Hill Country region compared to 1.26 inches per year (Ashworth, 1983) and 1.5 inches per year (Bluntzer, 1992; Mace and others, 2000); 0.6 inches per year in the Trans-Pecos region compared to 0.35 inches per year (Rees and Buckner, 1980); 0.1 to 2.9 inches per year in the eastern portion of the Edwards Plateau compared to 0.1 to 2.2 inches per year (Kuniansky, 1994); and 0.4 inches per year or 89,800 acre-feet per year for the Cenozoic Pecos Alluvium compared to 67,800 acre-feet per year (Ashworth, 1990).

## REFERENCES:

- Anaya, R. and Jones, I., C., 2004, Groundwater availability model for the Edwards-Trinity (Plateau) and Cenozoic Pecos Alluvium aquifer systems, Texas: Texas Water Development Board GAM report, 208 p., [http://www.twdb.state.tx.us/gam/eddt\\_p/eddt\\_p.htm](http://www.twdb.state.tx.us/gam/eddt_p/eddt_p.htm).
- Ashworth, J. B., 1983, Ground-water availability of the lower Cretaceous formations in the Hill Country of south-central Texas. Texas Department of Water Resources Report 273, 65 p.
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- Kuniansky, E. L., and Holligan, K. Q., 1994, Simulations of flow in the Edwards-Trinity aquifer system and contiguous hydraulically connected units, West-Central Texas: U.S. Geological Survey Water-Resources Investigations Report 93-4039, 40 p.
- Long, A. T., Jr., 1958. Ground-water geology of Real County, Texas. Texas Board of Water Engineers Bulletin B 5803, 46 p.
- Mace, R. E. and Anaya, R., 2004, Estimate of recharge to the Edwards (Balcones Fault Zone) and Edwards-Trinity (Plateau) aquifers in Kinney County, Texas: *in* Mace, R. M., Angle, E. S., and Mullican, W. F., III, ed., Aquifers of the Edwards Plateau: Texas Water Development Board, Report 360, pp. 345-366.
- Mace, R. E., Chowdhury, A. H., Anaya, R., and Way, S.-C., 2000, Groundwater availability of the Trinity Aquifer, Hill Country Area, Texas: numerical simulations through 2050: Texas Water Development Board Report 353, 117 p.
- Rees, R., and Buckner, A. W., 1980, Occurrence and quality of ground water in the Edwards-Trinity (Plateau) aquifer in the Trans-Pecos Region of Texas: Texas Department of Water Resources Report 255, 41 p.
- Reeves, R. D., 1969. Ground-water resources of Kerr County, Texas. Texas Water Development Board Report 102, 58 p.
- Shamburger, V. M., Jr., 1967, Ground-water resources of Mitchell and western Nolan counties, Texas. Texas Water Development Board Report 50, 175 p.

**County recharge values for the Edwards-Trinity (Plateau), Cenozoic Pecos Alluvium, and Trinity (Hill Country) aquifers where they are exposed at the surface within each county.**

**Annual recharge values were calibrated from the Edwards-Trinity (Plateau) and Cenozoic Pecos Alluvium GAM as a percentage of annual rainfall. The mean annual recharge values below were calculated for 30-year mean annual rainfall periods of 1961 to 1990 and of 1971 to 2000 for comparison.**

COUNTY	DESCRIPTION	RECHARGE VALUES
ANDREWS	Annual recharge recharge as a percent of annual rainfall (percent)	1.74
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.26
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	5,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.26
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	6,000
	Recharge area (square miles)	430
BANDERA	Annual recharge recharge as a percent of annual rainfall (percent)	3.97
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.16
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	49,400
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.20
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	50,900
	Recharge area (square miles)	798
BEXAR	Annual recharge recharge as a percent of annual rainfall (percent)	4.70
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.57
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	20,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.63
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	21,200
	Recharge area (square miles)	245
BLANCO	Annual recharge recharge as a percent of annual rainfall (percent)	4.62
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.49
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	43,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.55
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	45,600
	Recharge area (square miles)	552
BREWSTER	Annual recharge recharge as a percent of annual rainfall (percent)	4.43
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.66
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	31,000
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.66
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	30,900
	Recharge area (square miles)	874
BURNET	Annual recharge recharge as a percent of annual rainfall (percent)	3.86
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.18
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	2,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.25
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	2,600
	Recharge area (square miles)	39

COUNTY	DESCRIPTION	RECHARGE VALUES
COKE	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.46
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	5,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.45
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	5,900
	Recharge area (square miles)	244
COMAL	Annual recharge recharge as a percent of annual rainfall (percent)	4.45
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.52
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	29,300
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.57
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	30,400
	Recharge area (square miles)	362
CONCHO	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.49
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	8,200
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.51
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	8,500
	Recharge area (square miles)	314
CRANE	Annual recharge recharge as a percent of annual rainfall (percent)	1.34
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.18
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	5,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.18
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	5,700
	Recharge area (square miles)	581
CROCKETT	Annual recharge recharge as a percent of annual rainfall (percent)	1.70
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.31
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	45,700
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.31
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	46,300
	Recharge area (square miles)	2801
CULBERSON	Annual recharge recharge as a percent of annual rainfall (percent)	6.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.73
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	5,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.75
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	5,701
	Recharge area (square miles)	142
ECTOR	Annual recharge recharge as a percent of annual rainfall (percent)	2.13
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.31
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	12,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.31
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	12,500
	Recharge area (square miles)	766

COUNTY	DESCRIPTION	RECHARGE VALUES
EDWARDS	Annual recharge recharge as a percent of annual rainfall (percent)	3.47
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.85
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	96,000
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.86
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	96,700
	Recharge area (square miles)	2120
GILLESPIE	Annual recharge recharge as a percent of annual rainfall (percent)	3.09
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.93
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	44,700
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.97
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	46,900
	Recharge area (square miles)	905
GLASSCOCK	Annual recharge recharge as a percent of annual rainfall (percent)	2.15
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.39
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	16,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.39
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	16,300
	Recharge area (square miles)	784
HAYS	Annual recharge recharge as a percent of annual rainfall (percent)	4.70
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.58
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	31,100
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.65
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	32,500
	Recharge area (square miles)	370
HOWARD	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.39
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	1,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.40
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	1,500
	Recharge area (square miles)	72
IRION	Annual recharge recharge as a percent of annual rainfall (percent)	1.97
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.40
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	16,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.40
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	16,600
	Recharge area (square miles)	780
JEFF DAVIS	Annual recharge recharge as a percent of annual rainfall (percent)	6.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.89
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	15,400
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.88
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	15,300
	Recharge area (square miles)	325



COUNTY	DESCRIPTION	RECHARGE VALUES
KENDALL	Annual recharge recharge as a percent of annual rainfall (percent)	4.16
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.38
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	48,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.45
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	51,400
	Recharge area (square miles)	665
KERR	Annual recharge recharge as a percent of annual rainfall (percent)	2.62
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.76
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	44,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.79
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	46,500
	Recharge area (square miles)	1106
KIMBLE	Annual recharge recharge as a percent of annual rainfall (percent)	1.98
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.50
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	32,300
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.51
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	32,900
	Recharge area (square miles)	1214
KINNEY	Annual recharge recharge as a percent of annual rainfall (percent)	10.90
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	2.58
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	48,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	2.59
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	49,100
	Recharge area (square miles)	355
LOVING	Annual recharge recharge as a percent of annual rainfall (percent)	1.08
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.11
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	600
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.12
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	600
	Recharge area (square miles)	98
MARTIN	Annual recharge recharge as a percent of annual rainfall (percent)	3.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.49
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	2,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.48
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	2,800
	Recharge area (square miles)	110
MASON	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.53
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	2,200
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.55
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	2,300
	Recharge area (square miles)	78



COUNTY	DESCRIPTION	RECHARGE VALUES
McCULLOCH	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.52
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	5,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.54
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	5,800
	Recharge area (square miles)	198
MEDINA	Annual recharge recharge as a percent of annual rainfall (percent)	4.61
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.34
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	8,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.37
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	8,700
	Recharge area (square miles)	119
MENARD	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.49
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	22,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.51
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	23,400
	Recharge area (square miles)	870
MIDLAND	Annual recharge recharge as a percent of annual rainfall (percent)	2.53
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.39
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	18,000
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.39
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	18,000
	Recharge area (square miles)	862
NOLAN	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.49
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	12,100
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.48
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	11,900
	Recharge area (square miles)	464
PECOS	Annual recharge recharge as a percent of annual rainfall (percent)	5.14
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.76
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	179,100
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.77
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	181,400
	Recharge area (square miles)	4443
REAGAN	Annual recharge recharge as a percent of annual rainfall (percent)	1.81
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.34
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	21,100
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.34
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	21,100
	Recharge area (square miles)	1174

COUNTY	DESCRIPTION	RECHARGE VALUES
REAL	Annual recharge recharge as a percent of annual rainfall (percent)	3.19
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.88
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	32,700
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.88
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	33,000
	Recharge area (square miles)	700
REEVES	Annual recharge recharge as a percent of annual rainfall (percent)	5.42
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.64
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	79,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.66
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	83,200
	Recharge area (square miles)	2358
SCHLEICHER	Annual recharge recharge as a percent of annual rainfall (percent)	1.54
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.34
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	23,800
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.34
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	24,000
	Recharge area (square miles)	1310
STERLING	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.41
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	10,600
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.40
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	10,500
	Recharge area (square miles)	489
SUTTON	Annual recharge recharge as a percent of annual rainfall (percent)	1.65
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.37
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	28,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.37
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	29,000
	Recharge area (square miles)	1454
TAYLOR	Annual recharge recharge as a percent of annual rainfall (percent)	2.00
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.52
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	4,600
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.52
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	4,600
	Recharge area (square miles)	166
TERRELL	Annual recharge recharge as a percent of annual rainfall (percent)	2.25
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.34
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	42,700
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.35
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	44,100
	Recharge area (square miles)	2356

COUNTY	DESCRIPTION	RECHARGE VALUES
TOM GREEN	Annual recharge recharge as a percent of annual rainfall (percent)	1.98
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.43
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	11,500
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.43
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	11,600
	Recharge area (square miles)	502
TRAVIS	Annual recharge recharge as a percent of annual rainfall (percent)	3.52
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.15
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	16,100
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.20
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	16,800
	Recharge area (square miles)	263
UPTON	Annual recharge recharge as a percent of annual rainfall (percent)	1.98
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.30
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	17,700
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.31
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	17,900
	Recharge area (square miles)	1086
UVALDE	Annual recharge recharge as a percent of annual rainfall (percent)	6.07
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	1.61
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	33,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	1.61
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	33,900
	Recharge area (square miles)	394
VAL VERDE	Annual recharge recharge as a percent of annual rainfall (percent)	3.29
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.65
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	99,900
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.67
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	103,000
	Recharge area (square miles)	2894
WARD	Annual recharge recharge as a percent of annual rainfall (percent)	1.50
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.18
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	6,400
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.19
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	6,700
	Recharge area (square miles)	659
WINKLER	Annual recharge recharge as a percent of annual rainfall (percent)	1.01
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (inches per year)	0.13
	Mean annual recharge based on mean annual rainfall for 1961 to 1990 (acre-feet per year)	5,300
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (inches per year)	0.13
	Mean annual recharge based on mean annual rainfall for 1971 to 2000 (acre-feet per year)	5,400
	Recharge area (square miles)	759