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WATER BULLETIN NUMBER 51

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Flow of the Rio Grande  
and  
Related Data

*From Elephant Butte Dam, New Mexico  
to the Gulf of Mexico*

1981

STORAGE IN MAJOR RESERVOIRS  
SOURCES OF RIVER FLOW  
DIVERSIONS  
QUALITY OF WATER  
CLIMATOLOGICAL DATA  
DRAINAGE BASIN AND IRRIGATED AREAS

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## FOREWORD

This bulletin presents the fifty-first compilation of the stream discharges and related data concerning the international portion of the Rio Grande, prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission. The streamflow data and kindred subjects pertain to the Rio Grande and its important tributaries near their confluence with the main stream from Elephant Butte, New Mexico to the Gulf of Mexico. The first publication in the series was Water Bulletin No. 1 for the year 1931. The present volume contains information for the year 1981.

International stream gaging on the Rio Grande was initiated in 1889, when the station at El Paso, Texas was established. Several stations on the Rio Grande and its tributaries downstream from El Paso were established in 1900 and operated until 1974. Between 1914 and 1923, except for a few months in 1919 and 1920, all stream-gaging work on the international reach of the river was suspended. In 1923 the work was resumed and carried on independently by the two countries until 1931, when the present joint program of stream measurements was adopted.

During 1981 the United States Section of the Commission operated the stream-gaging stations on the Rio Grande at El Paso, American Dam, Clint, Acala, Fort Quitman, Candelaria, Above Rio Conchos, Below Rio Conchos, Johnson Ranch, Foster Ranch, Del Rio, El Indio, Rio Grande City, San Benito, and Brownsville. The Mexican Section operated the stream-gaging stations on the Rio Grande at Below Amistad Dam, Jimenez, Piedras Negras, Villa Hidalgo, Laredo, and Below Anzaiduas Dam. The station at Falcon Dam was operated jointly by the two Sections. Each Section operated the gaging stations on tributary streams, floodways, and diversions within its own country.

Beginning in 1976, the names of several gaging stations have been changed, pursuant to agreement between the two Sections of the Commission. Where it has been decided that some confusion may result from this change, a note giving the former name has been added to the descriptive heading of the gaging station.

The total drainage area within the outer rim of the Rio Grande basin is 335,500 square miles. However, about half of this area yields no runoff to the river, the estimated productive area of the watershed being 176,333 square miles. Reservoirs in the basin have a total storage capacity of approximately 11,898,000 acre-feet, in addition to the International Amistad and Falcon Reservoirs, which have a combined conservation capacity of 6,051,000 acre-feet. In the Rio Grande Basin, a rounded total of 2,088,000 acres is irrigated below Elephant Butte Dam on the Rio Grande and below Girvin on the Pecos River. The flow of the Rio Grande to the Gulf of Mexico below Brownsville prior to construction of Falcon Dam averaged 2,600,000 acre-feet per year for the period 1934-1952. For the period 1954-1981, this flow has averaged 933,200 acre-feet per year.

The mean sea level datum, referred to as the U. S. C. & G. S. in the description of the stream-gaging stations, is the North American Vertical Datum of 1927.

## Acknowledgments

Other agencies which have contributed to some part of the data published herein include: The Agricultural Research Service and the Soil Conservation Service of the U. S. Department of Agriculture; the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the National Weather Service of the U.S. Department of Commerce; the Texas Board of Health; the Texas Department of Water Resources; the Sanchez Ditch and Reservoir Company; the Middle Rio Grande Conservancy District; the Red Bluff Water Power Control District; State of Colorado, Division of Water Resources; the New Mexico State Engineer Office; the Rio Grande Compact Commission; the Willacy County Water Control and Improvement District No. 1; the Del Rio City Water Department; the Eagle Pass City Water Department; the Laredo City Water Department; the Del Mar Conservation District; Central Power and Light Company; the El Paso Department of Water and Sewerage; the Maverick County Water Control and Improvement District No. 1; the Ministry of Agriculture and Hydraulic Resources of Mexico; the Meteorological Service of Mexico; Meteorological Service of the State of Chihuahua, Mexico; Federal Power Commission of Mexico; Potable Water Board of Piedras Negras, Coahuila; the Federal Board of Public Improvement Works of Nuevo Laredo, Tamaulipas; and the Water and Drainage Board of Cd. Acuna, Coahuila.

Additional contributions have been made by individuals and corporations; and specific notation is made for such, as well as for those of the above-named agencies, where the data appear. The courtesy and cooperation of those who made these contributions are acknowledged with appreciation.

## Period Averages

In Water Bulletins Nos. 1 through 29, normal or average discharge volumes shown for the various gaging stations were based on a period beginning in 1924, or thereafter when records became available.

Beginning with Water Bulletin No. 30, the periods have been revised to include only the years following completion of major projects below which the flow of the Rio Grande or a major tributary was modified, or later when records became available. The revised periods are based on the completion of Caballo Dam in 1938, irrigation projects on the Rio Conchos and its tributaries in 1947, International Falcon Dam in 1953, and Amistad Dam and Luis L. Leon Dam in 1968.

For purposes of comparison with the average flows in the Rio Grande below Caballo Dam, records of average discharge in the Rio Grande below Elephant Butte Dam have also been revised to include the same period.

The period of record used to determine the average diversions from the Rio Grande to the United States below Falcon Dam published herein was restricted to begin in 1957, the first complete year of record after United States' waters in Falcon Reservoir were placed under the jurisdiction of the 93rd District Court of Texas.

## FOREWORD

Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units. The Mexican data are converted and reported in this bulletin in English units. Conversion factors conform generally to those in the National Bureau of Standards Miscellaneous Publication 286 "Units of Weight and Measure (United States Customary and Metric) - Definitions and Tables of Equivalents". However, for convenience some of the factors have been shortened and modified to facilitate conversion, reconversion to the original units when necessary, and checking of data. Conversion of the mean daily discharges, the monthly average discharge and the monthly volumes from metric to English units is direct. For this reason the monthly average discharge in cubic feet per second and monthly volumes in acre-feet shown for gaging stations operated by the Mexican Section cannot necessarily be obtained in the usual manner from the total monthly flow in second-foot days. For the same reason, evaporation and rainfall data, when totaled, may not be equivalent to the direct conversion from metric to English units. The following factors have been used for data in this bulletin.

| <u>METRIC UNITS</u> | <u>LENGTHS</u> | <u>ENGLISH UNITS</u>       |
|---------------------|----------------|----------------------------|
| 1 Centimeter        |                | 0.39370 Inch               |
| 1 Meter             |                | 3.28084 Feet               |
| 1 Kilometer         |                | 0.62137 Mile               |
| <u>AREAS</u>        |                |                            |
| 1 Square Meter      |                | 10.76391 Square Feet       |
| 1 Hectare           |                | 2.47105 Acres              |
| 1 Square Kilometer  |                | 0.38610 Square Mile        |
| <u>VOLUMES</u>      |                |                            |
| 1 Cubic Meter       | 61023.74       | Cubic Inches               |
| 1 Cubic Meter       | 35.31467       | Cubic Feet                 |
| 1 Cubic Meter       | 1.30795        | Cubic Yards                |
| 1000 Cubic Meters   | 0.81071        | Acre-Foot                  |
| 1 Liter             | 0.26417        | U. S. Gallon               |
| <u>WEIGHTS</u>      |                |                            |
| 1 Kilogram          | 2.20462        | Pounds                     |
| 1 Metric Ton        | 2204.623       | Pounds                     |
| 1 Metric Ton        | 1.10231        | Short Tons<br>(2,000 lbs.) |

Both English and metric units are used to report the figures in the descriptive headings and for the yearly figures of the annual and period summaries of all gaging station pages. Most of the stations have been converted to the metric system, and the yearly figures for the summaries cannot be obtained by direct conversion. The stations published in this bulletin that have not been converted to the metric system are those at Elephant Butte Dam, Caballo Dam, El Paso, American Canal, Below American Dam, McKee Spring, Cantu Spring, return flow from the Maverick Power Plant and the District, and the diversions from the Rio Grande, U. S. side, below Falcon Dam.

**GENERAL HYDROLOGIC CONDITIONS FOR 1981****Along and Adjacent to the International Portion of the Rio Grande**

During the year 1981, temperatures were about average on the watershed of the Rio Grande below El Paso, Texas. Evaporation was 88% of average. Precipitation was 132% of average from El Paso to Amistad Dam, 143% of average from Amistad Dam to Falcon Dam, 134% of average from Falcon Dam to Rio Grande City, and 140% of average in the Lower Rio Grande Valley on the United States side.

The yearly volume of flow of the Rio Grande was below average from El Paso to the confluence of the Rio Conchos with the Rio Grande, and above average from the confluence of the Rio Conchos to the Gulf of Mexico. In the reach between El Paso and the confluence of the Rio Conchos, the flow was 86% of average, ranging from 92% of average at El Paso to 49% at Acalá; in the reach between the confluence of the Rio Conchos and Amistad Reservoir, where flows were partly regulated by releases from Luis L. Leon Reservoir (El Granero) on the Rio Conchos, the flow was 148% of average; and in the reach between Amistad Dam and Falcon Reservoir, where flows were partly regulated by releases from Amistad Reservoir, the flow was 118% of average. Flows passing Rio Grande stations below Falcon Dam were partly regulated by releases from Falcon Reservoir. Such releases in 1981 amounted to 3,139,557 acre-feet, or 130% of the average for the twenty-eight years of operation, 1954 to 1981. The volume of flow wasted to the Gulf of Mexico was 1,889,623 acre-feet, which is 202% of the average for this twenty-eight year period.

The total annual flow of all measured tributaries below Fort Quitman was 147% of average. The total flow of these tributaries in the United States was 900,872 acre-feet, or 129% of average. For Mexico the measured tributary flow, excluding Rio Alamo and Rio San Juan, was 2,678,935 acre-feet, or 204% of average. The flows of the Rio Alamo and Rio San Juan were 52% and 39% of their respective averages.

Return flow to the Rio Grande at Maverick Power Plant near Eagle Pass was 889,049 acre-feet, or 150% of the fourteen-year average. Return flow to the Rio Grande through various drains in the Maverick County irrigation district, excluding storm inflow, amounted to 68,304 acre-feet, or 48% of the fourteen-year average.

There were no floods of consequence on the Rio Grande in 1981. The highest peak flows recorded on the Rio Grande were, above Falcon Dam, 24,600 second-feet at Villa Hidalgo; and, below Falcon Dam, 16,000 second-foot below Anzalduas Dam.

During October, Pecos River near Langtry and Devils River at Pafford had peaks of 58,600 and 142,000 second-feet, respectively. Inflow from these tributaries raised the level of Amistad Reservoir by 3.00 feet and increased the storage by 200,000 acre-feet.

For all reservoirs in the Rio Grande basin having a capacity greater than 15,000 acre-feet, excepting Amistad and Falcon International Reservoirs, the average amount of water in storage in 1981 was 6,562,400 acre-feet, or 145% of the average 4,511,000 acre-feet. In the United States, stored water in these reservoirs was 126% of average, while in Mexico it was 154% of average.

In International Amistad Reservoir there was a net increase in storage during the year of 671,200 acre-feet. Storage ranged from a low of 3,101,100 acre-feet on January 7 to a high of 3,826,600 acre-feet on October 22 and averaged 3,450,100 acre-feet during the year, or 114% of the average for the period 1969 through 1981. In International Falcon Reservoir there was a net increase in storage during the year of 578,300 acre-feet. The storage varied from a low of 2,170,900 acre-feet on January 1 to a high of 2,975,900 acre-feet on May 9 and averaged 2,605,100 acre-feet during the year, or 127% of the average for the twenty-eight years of operation, 1954 through 1981.

Diversions from the Rio Grande in the United States were 107% of average. DivERSIONS into the American Canal were 100% of average; into the Maverick Canal, 125% of average; and in the United States below Falcon Dam, 92% of the average for the twenty-five years, 1957-1981. In Mexico diversions were 79% of average. Diversions into the Acequia Madre were 127% of average, while diversions through the Anzalduas Canal for irrigation in Mexico were 76% of the twenty-eight year average.

In 1981, the total reported irrigated acreage from the Rio Grande and its tributaries below El Paso, Texas showed a decrease of 9% from the previous year. On the United States side, there was a decrease of about 8% above Falcon Dam and a decrease of 1% below, for an overall average decrease of 2%. On the Mexican side, there was an increase of 6% above Falcon Dam and a decrease of 27% below, for an overall average decrease of 14%.

The 1981 investigation of the quality of Rio Grande water extended from El Paso to Brownsville. The annual tonnage of salts carried by the river at Fort Quitman was 127% of the 1938-1981 average; above Amistad Reservoir at Foster Ranch, 104% of the 1968-1981 average; above Falcon Reservoir at Laredo, 118% of the 1968-1981 average; and at the station below Anzalduas Dam, 134% of the 1959-1981 average. The volume of suspended silt transported by the Rio Grande in 1981 was 109% of the 1969-1981 average at Foster Ranch above Amistad Reservoir, 46% of the 1968-1981 average at Laredo above Falcon Reservoir, and 223% of the 1955-1981 average at Brownsville.

## RIO GRANDE BELOW ELEPHANT BUTTE DAM, NEW MEXICO

**DESCRIPTION:** Concrete wall control, bubbler gage, and water-stage recorder located on the left bank 100 feet (30.5 m) upstream from the cableway at latitude 33° 08' 45", longitude 107° 12' 20", and river mile 1,389.1 (2,235.5 km); 0.7 river mile (1.1 km) downstream from Elephant Butte Dam, 1.5 river miles (2.4 km) upstream from Cuchillo Negro River, and 135.1 river miles (217.4 km) upstream from the American Dam at El Paso, Texas.

The zero of the gage is 4,242.09 feet (1,292.99 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 31 discharge measurements during the year and a continuous record of gage heights. Records were furnished by the United States Geological Survey. Records available: 1915 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Beginning December 1940, hydroelectric power generation facilities for 27,000 kva were placed in operation at Elephant Butte Dam.

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second) |      |              |  |     |          |  |      |            |              |      |  |
|---|------|--------------|--|-----|----------|--|------|------------|--------------|------|--|
| Daily:  | Max. | 8,220 (233)  |  | May | 22, 1942 |  | Min. | 0          | Occasionally |      |  |
| Monthly:  | Max. | 7,600 (215)  |  | May | 1942     |  | Min. | 1.2 (0.03) | Nov. 1971    |      |  |
| Yearly:   | Max. | 2,510 (71.1) |  |     | 1942     |  | Min. | 253 (7.16) |              | 1964 |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.     | March  | April   | May     | June    | July    | Aug.   | Sept.  | Oct.     | Nov.  | Dec.    |
|------------|---------|----------|--------|---------|---------|---------|---------|--------|--------|----------|-------|---------|
| 1          | 1,380   | 27.0     | 29.0   | 1,400 * | 1,480 * | 1,870   | 1,380 * | 696    | 365    | 19.0     | 595   | 941 *   |
| 2          | 1,230 * | 1,120    | * 20.0 | 1,420   | 1,460   | 1,850   | 1,330   | 690    | 1,130  | 19.0     | 646 * | 951     |
| 3          | 27.0    | 1,370    | 6.5    | 1,430   | 1,460   | 1,860   | 1,360   | 730 *  | 2,090  | 20.0     | 642   | 955     |
| 4          | 22.0    | 1,320    | 6.0    | 1,430   | 1,450   | 1,860   | 1,360   | 738    | 1,840  | 20.0     | 642   | 960     |
| 5          | 1,130   | 1,390    | 6.6    | 1,430   | 2,290   | 1,860   | 1,360   | 739    | 1,390  | 20.0     | 642   | 676     |
| 6          | 1,320   | 1,320    | 6.7    | 1,440   | 2,230   | 1,850   | 1,360   | 732    | 1,400  | * 20.0   | 642   | 676     |
| 7          | 1,310   | 34.0     | 7.3    | 1,450   | 2,260   | 1,860   | 1,360   | 724    | 1,410  | 19.0     | 646   | 969     |
| 8          | 1,290   | 29.0     | 10.0   | 1,460   | 2,240   | 1,860   | 1,360   | 722    | 918    | 19.0     | 646   | 978     |
| 9          | 761     | 1,160 *  | 12.0   | 1,470   | 2,230   | 1,860   | 1,360   | 709    | 26.0   | 20.0     | 649   | 983     |
| 10         | * 29.0  | 1,420 *  | 9.8    | 1,470 * | 2,220   | 1,850   | 1,370   | 705    | 22.0   | 19.0     | 652   | 992     |
| 11         | 23.0    | 1,410    | 6.9    | 1,470   | 2,200   | 1,850   | 1,360   | 711    | *      | 22.0     | 19.0  | 653     |
| 12         | 337     | 1,400    | 9.3    | 1,470   | 2,150   | 1,860 * | 1,360   | 711    | 21.0   | 18.0     | 656   | 712     |
| 13         | 338     | 1,310 *  | 8.5    | 1,470   | 2,190   | 1,860   | 1,360   | 700    | 20.0   | 16.0     | 659   | 724     |
| 14         | 414     | 30.0     | 11.0   | 1,470   | 2,180   | 1,860   | 1,370   | 699    | 19.0   | 13.0     | 656   | 1,040   |
| 15         | 1,340   | 25.0     | 11.0   | 1,470   | 2,170 * | 1,860   | 1,370   | 703    | 18.0 * | 12.0     | 663   | 1,040 * |
| 16         | 1,340   | 1,160    | 13.0   | 1,490   | 2,160   | 1,870   | 1,380   | 700    | *      | 17.0     | 12.0  | 669     |
| 17         | 42.0    | 1,410    | 19.0   | 1,500   | 2,160   | 1,880   | 1,360 * | 700    | *      | 15.0     | 12.0  | 669     |
| 18         | 26.0    | 1,410    | * 15.0 | 1,510   | 2,070   | 1,880   | 1,390   | 700 *  | *      | 15.0     | 12.0  | 669     |
| 19         | 1,180   | 1,420    | 29.0   | 1,510   | 2,060   | 1,870   | 1,410   | 701    | *      | 15.0     | 12.0  | 669     |
| 20         | 1,430   | 1,310    | 26.0   | 1,520   | 2,030   | 1,890   | 1,400   | 697    | *      | 15.0     | 11.0  | 663 *   |
| 21         | 1,350 * | 30.0     | 21.0   | 1,520   | 2,040   | 1,890   | 1,400   | 370    | 15.0   | 11.0     | 666   | 1,130   |
| 22         | 1,350   | 29.0     | 24.0   | 1,520   | 2,120 * | 1,850   | 1,410   | 328    | 15.0   | 11.0     | 669   | 1,140   |
| 23         | 1,300   | 1,180    | 27.0   | 1,520   | 2,130   | 1,860   | 1,430   | 335    | 14.0   | 12.0     | 669   | 1,150   |
| 24         | 33.0    | 1,440    | 27.0   | 1,520   | 2,120   | 1,860   | 1,430   | 340    | 228    | 11.0     | 673   | 1,170   |
| 25         | 27.0    | 1,450    | 27.0   | 1,520   | 2,110   | 1,860   | 1,440   | 340    | 687    | 11.0     | 673   | 848     |
| 26         | 1,110   | 1,450    | 92.0   | 1,520   | 2,110   | 1,860   | 1,460   | 344    | 698    | 11.0     | 673   | 856     |
| 27         | 1,370   | 1,380    | 18.0   | 1,500   | 2,110   | 1,860   | 1,470   | 356    | 704    | 11.0     | 673   | 868     |
| 28         | 1,370   | 30.0     | 15.0   | 1,510   | 2,110   | 1,860   | 701     | 359    | 249    | 11.0     | 680   | 1,240   |
| 29         | 1,380   |          | 15.0   | 1,500   | 2,110   | 1,860   | 685     | 356    | 19.0   | 12.0     | 680   | 1,270   |
| 30         | 1,270 * |          | 19.0   | 1,490   | 2,110   | 1,540   | 702     | 358    | 19.0   | 19.0     | 680   | 1,290   |
| 31         | 33.0    |          | 18.0   |         | 2,100   |         | 698     | 354 *  |        | 13.0     |       | 1,300   |
| <b>Sum</b> |         | 27,064.0 | 44,400 |         | 55,560  |         |         | 18,047 |        | 465.0    |       | 30,631  |
|            |         | 25,562.0 | 565.6  |         | 63,860  |         |         | 40,186 |        | 13,416.0 |       | 19,764  |

| Current Year 1981 |                   |     |                         |       |                           |                 |           |            |         |           |                | Period 1938-1981 |  |  |  |  |  |
|-------------------|-------------------|-----|-------------------------|-------|---------------------------|-----------------|-----------|------------|---------|-----------|----------------|------------------|--|--|--|--|--|
| Month             | Extreme Gage Feet |     | 0 Extreme Second-Feet   |       | Average Second-Feet       | Total Acre-Feet | Acre-Feet |            |         |           |                |                  |  |  |  |  |  |
|                   | High              | Low | Day                     | Day   |                           |                 | Average   | Maximum    | Minimum |           |                |                  |  |  |  |  |  |
| Jan.              |                   |     | 20                      | 1,430 | 4                         | 22.0            | 825       | 50,701     | 24,758  | 86,500    | 200            |                  |  |  |  |  |  |
| Feb.              |                   |     | 125                     | 1,450 | 15                        | 25.0            | 967       | 53,681     | 36,994  | 88,861    | 188            |                  |  |  |  |  |  |
| Mar.              |                   |     | 26                      | 92.0  | 4                         | 6.0             | 18.2      | 1,122      | 67,270  | 128,925   | 1,122          |                  |  |  |  |  |  |
| Apr.              |                   |     | 120                     | 1,520 | 1                         | 1,400           | 1,480     | 88,066     | 78,235  | 162,000   | 11,207         |                  |  |  |  |  |  |
| May               |                   |     | 5                       | 2,290 | 4                         | 1,450           | 2,060     | 126,664    | 81,152  | 467,000   | 512            |                  |  |  |  |  |  |
| June              |                   |     | 120                     | 1,890 | 30                        | 1,510           | 1,850     | 110,202    | 91,871  | 363,000   | 16,913         |                  |  |  |  |  |  |
| July              |                   |     | 27                      | 1,470 | 29                        | 685             | 1,300     | 79,708     | 92,500  | 211,000   | 41,352         |                  |  |  |  |  |  |
| Aug.              |                   |     | 5                       | 739   | 22                        | 328             | 582       | 35,796     | 73,868  | 134,000   | 9,530          |                  |  |  |  |  |  |
| Sept.             |                   |     | 3                       | 2,090 | 23                        | 14.0            | 447       | 26,610     | 31,396  | 129,000   | 163            |                  |  |  |  |  |  |
| Oct.              |                   |     | 13                      | 20.0  | 120                       | 11.0            | 15.0      | 922        | 15,571  | 72,100    | 166            |                  |  |  |  |  |  |
| Nov.              |                   |     | 128                     | 680   | 1                         | 595             | 659       | 39,201     | 16,531  | 158,000   | 74.2           |                  |  |  |  |  |  |
| Dec.              |                   |     | 31                      | 1,300 | 15                        | 676             | 988       | 60,756     | 20,993  | 87,300    | 179            |                  |  |  |  |  |  |
|                   |                   |     |                         | 2,290 |                           | 6.0             | 930       | 673,429    | 631,139 | 1,818,800 | 183,415        |                  |  |  |  |  |  |
| Yearly            | Meters            |     | Cubic Meters per Second |       | Thousands of Cubic Meters |                 |           | Mean daily |         |           | And other days |                  |  |  |  |  |  |
|                   |                   |     |                         | 64.9  |                           | 0.17            | 26.3      | 830,675    | 778,510 | 2,243,490 | 226,242        |                  |  |  |  |  |  |

\* Discharge measurement made on this day

## RIO GRANDE BELOW CABALLO DAM, NEW MEXICO

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank at latitude 32°53'05", longitude 107°17'30", and river mile 1,360.8 (2,190.0); 0.8 river mile (1.3 km) downstream from Caballo Dam, about 3 miles (5 km) northeast of Arrey, New Mexico, 5 miles (8.0 km) south of Caballo, New Mexico, and 106.8 river miles (171.9 km) upstream from the American Dam at El Paso, Texas. The zero of the gage is 4,140.90 feet (1,262.15 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 85 discharge measurements during the year and a continuous record of gage heights. Records were furnished by the El Paso office of the United States Bureau of Reclamation. Records available: 1938 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. In addition to the outflow from Caballo Dam listed below, 1,358 acre-feet (1,675,000 m<sup>3</sup>) of water were diverted in 1981 into the Bonita Lateral, a small irrigation canal just below Caballo Dam. Prior to 1938, discharge records were kept at Percha Dam, a low diversion dam about 1.5 miles (2.4 km) downstream from this station. Small accretions to the river take place between the station and Percha Dam.

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second) |      |       |        |     |          |      |     |         |              |       |      |
|---|------|-------|--------|-----|----------|------|-----|---------|--------------|-------|------|
| ly:   | Max. | 7,650 | (217)  | May | 20, 1942 | Min. | 0.1 | (0.003) | Several days | 1954, |      |
| nthly:  | Max. | 6,710 | (190)  | May | 1942     | Min. | 0.1 | (0.003) | 1955 and     | 1972  |      |
| earily:   | Max. | 2,480 | (70.2) |     |          | Min. | 284 | (8.04)  | Nov. & Dec.  | 1955  | 1964 |
|   |      |       |        |     |          |      |     |         |              |       |      |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.  | Feb.    | March   | April   | May     | June    | July    | Aug.    | Sept.    | Oct.  | Nov.  | Dec.  |
|------------|-------|---------|---------|---------|---------|---------|---------|---------|----------|-------|-------|-------|
| 1          | 1.6   | 1.6     | 1,200   | 1,560 * | 1,040 * | 1,580   | 1,260   | 1,670   | 2,120 *  | 1.9   | 1.1   | * 0.7 |
| 2          | 1.6   | 1.6     | 1,290   | 1,660   | 560     | 1,500 * | 1,260   | 1,580   | 2,220    | 1.4   | 1.1   | .8    |
| 3          | 1.7   | 1.6     | 973*    | 1,500   | 564     | 1,560 * | 1,300 * | 1,440   | 2,250    | * .9  | 1.1   | 1.0   |
| 4          | 1.7   | 326 *   | 773     | 1,480 * | 683     | 1,460   | 1,330   | 1,580 * | 1,790 *  | .9    | 1.1   | 1.2   |
| 5          | 1.7   | 619     | 784     | 1,460   | 867     | 1,370 * | 1,230   | 1,880 * | 1,420    | .9    | 1.1   | 1.3   |
| 6          | *     | 614     | 823     | 1,350 * | 1,010   | 1,280   | 1,080   | 1,790   | 1,310    | .9    | 1.1   | 1.5   |
| 7          | *     | 609     | 839     | 1,410 * | 1,060   | 1,290   | 1,530 * | 1,530   | 1,190    | 1.0   | 1.0   | 1.6   |
| 8          | 1.8   | 604     | 874     | 1,470   | 1,200 * | 1,220   | 1,940   | 1,330 * | 721      | 1.0   | 1.0   | * 1.8 |
| 9          | 1.7   | 604     | 931*    | 1,470   | 1,320   | 1,500 * | 1,940   | 1,130   | 655      | 1.0   | 1.0   | 1.7   |
| 10         | 1.7   | 483 *   | 1,150*  | 1,380 * | 1,270   | 1,770   | 1,780 * | 1,250   | 903 *    | 1.0   | * 1.0 | 1.6   |
| 11         | 1.7   | 400 *   | 1,240   | 1,290   | 1,220   | 1,770   | 1,640   | 1,140 * | 1,410 *  | 1.0   | 1.0   | 1.5   |
| 12         | 1.7   | 285     | 1,310   | 1,280   | 1,600   | 1,820 * | 1,610   | 853     | 1,360    | 1.0   | 1.0   | 1.4   |
| 13         | 1.6   | 2.0     | 1,370*  | 1,280   | 1,940   | 1,830   | 1,540   | 751     | 1,340 *  | 1.0   | 1.0   | 1.3   |
| 14         | 1.6   | 2.0     | 1,410   | 1,480   | 2,070   | 1,870   | 1,850 * | 779 *   | 172      | 1.1   | 1.0   | 1.2   |
| 15         | 1.6   | 98.0    | 1,410   | 1,640 * | 2,060   | 1,800   | 2,010   | 689     | 13.0     | 1.1   | 1.0   | * 1.0 |
| 16         | 1.6   | 161     | 1,460   | 1,640   | 1,920   | 1,900 * | 1,940   | 800 *   | 5.0      | * 1.1 | 1.0   | 1.1   |
| 17         | 1.6   | 173 *   | 1,570 * | 1,350 * | 1,900   | 2,070   | 1,710   | 665     | * 2.8    | 1.2   | 1.0   | 1.1   |
| 18         | 1.5   | 177 *   | 1,660   | 1,120   | 1,900   | 2,080   | 1,570   | 811 *   | 19.0     | 1.2   | 1.0   | 1.2   |
| 19         | 1.5   | 204     | 1,660   | 1,110   | 1,800 * | 1,980 * | 1,600   | 933     | 2.8      | 1.2   | 1.0   | 1.2   |
| 20         | 1.5   | 166     | 1,740*  | 983 *   | 1,600   | 1,890   | 1,590   | 1,050   | 2.8      | 1.2   | 1.0   | 1.3   |
| 21         | * 1.5 | 159     | 1,770   | 1,320 * | 1,530 * | 1,830   | 1,910 * | 1,050 * | 2.8      | * 1.2 | 1.0   | 1.3   |
| 22         | 1.5   | 154     | 1,770   | 1,600   | 1,470 * | 1,820   | 2,190   | 1,040   | 2.7      | 1.2   | 1.0   | * 1.4 |
| 23         | 1.5   | 153 *   | 1,770   | 1,590   | 1,420   | 2,080 * | 2,190   | 1,030   | 2.6      | 1.0   | 1.0   | 1.4   |
| 24         | 1.5   | 154     | 1,870*  | 1,280 * | 1,420   | 2,260   | 2,170   | 846     | 2.5      | 1.0   | .9    | 1.4   |
| 25         | 1.6   | 442     | 1,920   | 1,020   | 1,410   | 2,260   | 2,200   | 1,350 * | 2.4      | 1.0   | .9    | 1.4   |
| 26         | 1.6   | 716 *   | 1,990   | 1,020   | 1,650 * | 2,200 * | 2,190   | 1,950   | * 2.4    | 1.0   | .9    | 1.4   |
| 27         | 1.6   | 928 *   | 1,790   | 1,030   | 1,850   | 2,190   | 2,140   | 1,780   | 2.4      | * 1.0 | .8    | 1.4   |
| 28         | * 1.6 | 1,160   | 1,570*  | 1,060 * | 1,850   | 2,090   | 2,090 * | 1,890 * | 2.4      | * 1.1 | .8    | 1.4   |
| 29         | 1.6   | 1,620   | 1,060   | 1,780 * | 1,980   | 1,980   | 2,120   | 1,910   | 2.4      | 1.1   | .7    | 1.4   |
| 30         | 1.6   | 1,630   | 1,060   | 1,710   | 1,750 * | 1,820   | 1,960   | 2,000   | 2.4      | 1.1   | .7    | 1.4   |
| 31         | 1.6   | 1,590*  | 1,710   | 1,710   | 1,680 * | 1,680   | 2,000   |         | 1.1      |       |       |       |
| <b>Sum</b> |       | 9,397.8 | 39,953  | 54,000  |         | 40,457  |         |         | 33.8     |       | 40.8  |       |
|            |       | 50.2    | 43,757  | 45,384  |         | 54,410  |         |         | 19,031.4 |       | 29.3  |       |

| Current Year 1981 |                   |     |     |                         |       |     |                           |                 |           |         |           | Period 1938-1981 |           |         |
|-------------------|-------------------|-----|-----|-------------------------|-------|-----|---------------------------|-----------------|-----------|---------|-----------|------------------|-----------|---------|
| Month             | Extreme Gage Feet |     |     | Extreme Second-Feet     |       |     | Average Second-Feet       | Total Acre-Feet | Acre-Feet |         |           | Average          | Maximum   | Minimum |
|                   | High              | Low | Day | High                    | Low   | Day |                           |                 | Average   | Maximum | Minimum   |                  |           |         |
| Jan.              |                   |     |     | 1.6                     | 1.8   | 118 | 1.5                       | 99.6            | 1,190     | 21,032  | 19.2      |                  |           |         |
| Feb.              |                   |     |     | 28                      | 1,160 | 11  | 1.6                       | 336             | 18,640    | 64,300  | 11.7      |                  |           |         |
| Mar.              |                   |     |     | 26                      | 1,990 | 4   | 773                       | 1,410           | 86,791    | 83,236  | 24,900    |                  |           |         |
| Apr.              |                   |     |     | 2                       | 1,660 | 20  | 983                       | 1,330           | 79,246    | 78,651  | 212,000   | 25,470           |           |         |
| May               |                   |     |     | 14                      | 2,070 | 2   | 560                       | 1,460           | 90,018    | 73,830  | 412,000   | 75.2             |           |         |
| June              |                   |     |     | 124                     | 2,260 | 8   | 1,220                     | 1,800           | 107,107   | 103,165 | 354,000   | 25,289           |           |         |
| July              |                   |     |     | 25                      | 2,200 | 6   | 1,080                     | 1,760           | 107,921   | 108,961 | 238,000   | 28,200           |           |         |
| Aug.              |                   |     |     | 31                      | 2,000 | 17  | 665                       | 1,310           | 80,245    | 104,387 | 179,000   | 20,500           |           |         |
| Sept.             |                   |     |     | 3                       | 2,250 | 125 | 2.4                       | 634             | 37,748    | 47,535  | 181,000   | 6,757            |           |         |
| Oct.              |                   |     |     | 1                       | 1.9   | 13  | .9                        | 67.0            | 3,833     | 35,400  |           | 15.5             |           |         |
| Nov.              |                   |     |     | 1                       | 1.1   | 129 | .7                        | 1.0             | 58.1      | 2,058   | 14,400    |                  | 7.0       |         |
| Dec.              |                   |     |     | 8                       | 1.8   | 1   | .7                        | 1.3             | 80.9      | 2,134   | 19,100    |                  | 6.0       |         |
|                   |                   |     |     |                         | 2,260 |     | 0.7                       | 840             | 608,021.6 | 616,673 | 1,795,670 |                  | 206,084.6 |         |
| Yearly            | Meters            |     |     | Cubic Meters per Second |       |     | Thousands of Cubic Meters |                 |           |         |           |                  |           |         |
|                   |                   |     |     |                         | 64.0  |     | 0.02                      | 23.8            | 749,995   | 760,666 | 2,214,959 | 254,205          |           |         |

\* Discharge measurement made on this day      0 Mean daily      ! And other days

## RIO GRANDE AT EL PASO, TEXAS

**DESCRIPTION:** Gravity well and water-stage recorder located on the downstream side of the first pier from the left abutment of the Courchesne Bridge at latitude  $31^{\circ}48'10''$ , longitude  $106^{\circ}32'25''$ , and river mile 1,255.7 (2,020.8 km); 5.5 river miles (8.9 km) upstream from the Paso del Norte Bridge between El Paso, Texas and Cd. Juarez, Chihuahua and 1.7 miles (2.7 km) upstream from the American Dam at El Paso, Texas. The zero of the gage is 3,722.30 feet (1,134.56 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Mean daily discharges in 1981 were computed by adding the flows in the American Canal and the flows at the river station below the American Dam. Because the mean daily discharges are rounded, the monthly sum for this station may not equal the sum of the monthly sums of the other two stations. Extreme discharges are those passing the El Paso station, where measurements are made only during high flows. Records available: 1889 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 24,000 second-feet ( $680 \text{ m}^3/\text{sec}$ ) on June 12, 1905. Min. occasionally no flow. Since Elephant Butte Dam was closed in 1915, the largest peak flow to pass this station was 13,500 second-feet ( $382 \text{ m}^3/\text{sec}$ ) on September 3, 1925.

Average Flow in Second-Feet (Cubic Meters per Second)

|  | Daily: Max. 23,680 (671)   | June 12, 1905 | Min. 0           | Occasionally |
|--|----------------------------|---------------|------------------|--------------|
|  | Monthly: Max. 14,300 (405) | June 1905     | Min. 0           | Occasionally |
|  | Yearly: Max. 2,780 (78.7)  | 1905          | Min. 70.1 (1.99) | 1902         |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.           | Feb.          | March | April         | May   | June          | July  | Aug.          | Sept. | Oct.           | Nov. | Dec. |
|------------|----------------|---------------|-------|---------------|-------|---------------|-------|---------------|-------|----------------|------|------|
| 1          | 61.0           | 49.7          | 156   | 668           | 473   | 876           | 1,210 | 1,100         | 958   | 232            | 129  | 93.5 |
| 2          | 61.0           | 47.0          | 356   | 666           | 629   | 881           | 1,080 | 1,020         | 997   | 222            | 133  | 97.1 |
| 3          | 61.0           | 49.7          | 433   | 792           | 695   | 800           | 870   | 1,020         | 1,010 | 263            | 130  | 90.3 |
| 4          | 61.0           | 48.6          | 566   | 816           | 677   | 686           | 773   | 942           | 1,000 | 278            | 128  | 86.3 |
| 5          | 61.0           | 52.2          | 506   | 657           | 390   | 808           | 860   | 901           | 1,070 | 261            | 127  | 81.0 |
| 6          | 61.0           | 52.7          | 324   | 621           | 440   | 719           | 903   | 766           | 951   | 234            | 123  | 81.1 |
| 7          | 61.0           | 337           | 250   | 630           | 423   | 745           | 865   | 951           | 1,290 | 216            | 123  | 84.3 |
| 8          | 61.0           | 471           | 243   | 579           | 446   | 716           | 711   | 1,050         | 1,270 | 227            | 116  | 79.5 |
| 9          | 61.0           | 531           | 301   | 501           | 444   | 696           | 702   | 911           | 1,210 | 223            | 116  | 79.8 |
| 10         | 60.9           | 544           | 272   | 480           | 574   | 624           | 768   | 933           | 994   | 207            | 115  | 83.5 |
| 11         | 60.9           | 540           | 267   | 474           | 756   | 580           | 777   | 807           | 744   | 202            | 113  | 83.3 |
| 12         | 60.9           | 524           | 337   | 536           | 752   | 762           | 795   | 877           | 638   | 191            | 115  | 82.0 |
| 13         | 59.9           | 415           | 382   | 556           | 673   | 744           | 737   | 951           | 694   | 185            | 112  | 80.4 |
| 14         | 59.9           | 399           | 360   | 590           | 685   | 824           | 761   | 649           | 674   | 177            | 113  | 76.3 |
| 15         | 59.9           | 299           | 464   | 607           | 698   | 922           | 717   | 529           | 961   | 173            | 107  | 76.1 |
| 16         | 60.9           | 195           | 467   | 598           | 787   | 986           | 801   | 606           | 568   | 167            | 105  | 74.8 |
| 17         | 60.9           | 155           | 498   | 577           | 840   | 924           | 814   | 716           | 464   | 169            | 98.9 | 73.1 |
| 18         | 60.9           | 117           | 506   | 643           | 780   | 851           | 794   | 611           | 440   | 161            | 101  | 72.6 |
| 19         | 61.9           | 102           | 504   | 699           | 807   | 771           | 942   | 644           | 504   | 150            | 93.5 | 72.6 |
| 20         | 51.9           | 85.5          | 458   | 663           | 802   | 794           | 714   | 572           | 510   | 150            | 97.8 | 82.6 |
| 21         | 50.9           | 75.7          | 469   | 641           | 804   | 821           | 721   | 651           | 501   | 153            | 94.6 | 78.5 |
| 22         | 50.9           | 68.7          | 484   | 617           | 708   | 829           | 643   | 556           | 404   | 146            | 93.9 | 75.0 |
| 23         | 48.9           | 64.1          | 540   | 601           | 650   | 778           | 768   | 593           | 334   | 143            | 94.6 | 68.5 |
| 24         | 50.9           | 62.5          | 586   | 720           | 715   | 747           | 924   | 645           | 335   | 143            | 94.5 | 67.5 |
| 25         | 50.9           | 62.5          | 552   | 741           | 747   | 790           | 959   | 623           | 308   | 147            | 96.6 | 69.1 |
| 26         | 55.9           | 64.5          | 531   | 690           | 744   | 799           | 923   | 551           | 302   | 141            | 91.9 | 72.2 |
| 27         | 55.9           | 62.1          | 489   | 539           | 716   | 822           | 1,050 | 469           | 346   | 138            | 92.5 | 72.6 |
| 28         | 52.9           | 65.1          | 538   | 527           | 719   | 911           | 1,130 | 948           | 298   | 138            | 98.9 | 71.5 |
| 29         | 52.9           | 66.8          | 487   | 669           | 1,260 | 1,120         | 840   | 276           | 138   | 103            | 72.7 |      |
| 30         | 51.9           | 607           | 483   | 704           | 1,190 | 1,010         | 913   | 245           | 138   | 98.9           | 73.7 |      |
| 31         | 52.9           | 678           | 746   | 1,440         |       |               |       | 940           | 132   |                | 74.8 |      |
| <b>Sum</b> | <b>5,539.6</b> | <b>18,399</b> |       | <b>24,657</b> |       | <b>24,285</b> |       | <b>5,645</b>  |       | <b>2,426.3</b> |      |      |
|            | <b>1,782.8</b> | <b>13,792</b> |       | <b>20,693</b> |       | <b>27,282</b> |       | <b>20,296</b> |       | <b>3,255.6</b> |      |      |

## Current Year 1981

## Period 1938-1981

| Month  | Extreme Gage Feet |      |     | Extreme Second-Feet            |     | Average Second-Feet | Total Acre-Feet | Acre-Feet                        |         |           |  |  |
|--------|-------------------|------|-----|--------------------------------|-----|---------------------|-----------------|----------------------------------|---------|-----------|--|--|
|        | High              |      | Low | High                           |     |                     |                 | Average                          | Maximum | Minimum   |  |  |
|        | High              | Low  |     | Day                            | Day |                     |                 |                                  |         |           |  |  |
| Jan.   | 2.06              | 1.90 | 19  | 61.9                           | 23  | 48.9                | 57.5            | 3,536                            | 6,196   | 15,594    |  |  |
| Feb.   | 3.47              | 1.86 | 11  | 549                            | 1   | 45.1                | 198             | 10,988                           | 7,129   | 52,200    |  |  |
| Mar.   | 3.95              | 2.15 | 31  | 697                            | 1   | 108                 | 445             | 21,356                           | 33,687  | 1,790     |  |  |
| Apr.   | 4.30              | 3.35 | 3   | 892                            | 11  | 442                 | 613             | 36,494                           | 40,521  | 139,000   |  |  |
| May    | 4.39              | 3.12 | 17  | 910                            | 5   | 356                 | 668             | 41,044                           | 43,170  | 522       |  |  |
| June   | 5.35              | 3.50 | 29  | 1,270                          | 11  | 546                 | 822             | 48,906                           | 51,773  | 304,000   |  |  |
| July   | 5.60              | 3.60 | 31  | 2,090                          | 23  | 605                 | 880             | 54,113                           | 57,532  | 198,000   |  |  |
| Aug.   | 4.77              | 3.05 | 1   | 1,810                          | 27  | 395                 | 783             | 48,169                           | 56,055  | 158,000   |  |  |
| Sept.  | 5.68              | 2.75 | 7   | 1,530                          | 30  | 236                 | 677             | 40,257                           | 38,001  | 171,000   |  |  |
| Oct.   | 2.84              | 2.35 | 3   | 298                            | 31  | 130                 | 182             | 11,197                           | 13,424  | 151       |  |  |
| Nov.   | 2.38              | 2.10 | 2   | 134                            | 26  | 81.5                | 109             | 6,457                            | 8,070   | 21,300    |  |  |
| Dec.   | 2.25              | 2.03 | 14  | 109                            | 124 | 67.3                | 78.3            | 4,812                            | 7,602   | 25,600    |  |  |
|        | 5.68              | 1.86 |     | 2,090                          |     | 85.1                | 460             | 333,329                          | 363,160 | 1,559,200 |  |  |
| Yearly | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |     |                     |                 | <b>Thousands of Cubic Meters</b> |         |           |  |  |
|        | 1.73              | 0.57 |     | 59.2                           |     | 1.28                | 13.0            | 411,162                          | 447,961 | 1,923,273 |  |  |
|        |                   |      |     |                                |     |                     |                 |                                  |         | 70,903    |  |  |

## DIVERSIONS FROM THE RIO GRANDE AMERICAN CANAL AT EL PASO, TEXAS

**DESCRIPTION:** Concrete control consisting of two triangular-shaped wingwalls extending toward the center of the canal about one-fourth of the canal width and downstream at 30° angle with the canal side walls, bubbler gage, water-stage recorders (graphic and digital), and binary decimal transmitter located on the right bank of the concrete-lined canal at El Paso, Texas, latitude 31°46'40", longitude 106°31'35", and about 2,400 feet (700 m) downstream from the headgates of the American Dam, which are located at river mile 1,254.0 (2,018.0 km). The zero of the gage is 3,712.09 feet (1,131.45 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 24 discharge measurements during the year, a stable rating curve at medium and high flows, and a continuous record of gage heights. Records available: June 2, 1938 through 1981.

**REMARKS:** This canal diverts water from the Rio Grande at the American Dam at El Paso, Texas, 2.1 river miles (3.4 km) upstream from the International Dam at Juarez, Chihuahua. Water from this canal discharges into the Franklin Canal from which water is frequently returned to the Rio Grande at spillways 2.2 (3.5), 2.7 (4.3), and 3.6 (5.8) river miles (km) downstream from the American Dam. The transmitter relays gage height data upon interrogation by telephone via commercial circuits.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,840 second-feet (52.1 m<sup>3</sup>/sec) on March 27, 1944. Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |               |                  |                       |
|----------|-------------------|---------------|------------------|-----------------------|
| Daily:   | Max. 1,510 (42.8) | Aug. 13, 1945 | Min. 0           | Frequently            |
| Monthly: | Max. 1,210 (34.3) | Aug. 1943     | Min. 0           | Frequently since 1952 |
| Yearly:  | Max. 748 (21.2)   | 1943          | Min. 65.6 (1.86) | 1956                  |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.   | Feb.           | March         | April         | May           | June         | July           | Aug.  | Sept. | Oct.  | Nov.   | Dec.   |
|------------|--------|----------------|---------------|---------------|---------------|--------------|----------------|-------|-------|-------|--------|--------|
| 1          | 60.0   | 48.8           | 154           | 511           | 301           | 695 *        | 1,030          | 850   | 813   | 228 * | 129    | 93.5   |
| 2          | 60.0   | 46.1           | 354           | 472 *         | 472           | 676          | 894            | 824   | 879   | 219   | 133 *  | 97.1   |
| 3          | 60.0   | 48.8           | 431           | 574           | 540           | 602          | 682            | 831   | 895 * | 260   | 130    | 90.3   |
| 4          | 60.0   | * 47.7         | 564           | 600           | 525 *         | 490          | 589            | 750   | 882   | 276   | 128    | 86.3   |
| 5          | 60.0   | 51.3           | 504           | 444           | 240           | 604          | 670            | 705 * | 948   | 259   | 127    | 81.0   |
| 6          | 60.0   | 51.8           | 322           | 408           | 291           | 521          | 713 *          | 570   | 828   | 232   | 123    | 81.1   |
| 7          | 60.0   | 336            | 248           | 420           | 276           | 540          | 679            | 749   | 932   | 215   | 123    | 84.3   |
| 8          | 60.0   | 468            | 241           | 371           | 299           | 516          | 519            | 856   | 1,070 | 226   | 116    | 79.5   |
| 9          | 60.0   | 528            | 299           | 295 *         | 298           | 492          | 507            | 718   | 1,080 | 222   | 116    | 79.8   |
| 10         | 60.0   | 541            | 270           | 278           | 427           | 422 *        | 569            | 731   | 872 * | 207   | 115    | 83.5   |
| 11         | 60.0   | 537            | 265           | 267           | 610           | 371          | 580            | 611   | 608   | 202   | 113    | 83.3   |
| 12         | 60.0   | 521            | 335           | 326           | 606           | 547          | 596            | 675   | 493   | 191   | 115    | 82.0   |
| 13         | 59.0   | 412            | 380           | 351           | 531           | 539          | 534            | 743   | 548   | 185   | 112    | 80.4   |
| 14         | 59.0   | 396            | 358           | 378           | 544           | 612          | 554            | 437   | 543   | 177   | 113    | 76.3   |
| 15         | 59.0   | 296            | 462           | 401           | 561           | 711          | 512            | 310   | 875 * | 173   | 107    | 76.1   |
| 16         | 60.0   | 193            | 465           | 394           | 648           | 778          | 593            | 361   | 539   | 167   | 105    | 74.8   |
| 17         | 60.0   | 153            | 496           | 369           | 700           | 726          | 609            | 488   | 436   | 169   | 98.9   | 73.1   |
| 18         | 60.0   | 115            | 503 *         | 430           | 641           | 650          | 594            | 395   | 414   | 161   | 101    | 72.6   |
| 19         | * 61.0 | 99.7           | 501           | 485           | 667           | 571          | 741            | 428   | 480   | 150   | * 93.5 | 72.6   |
| 20         | 51.0   | 83.6           | 455           | 452           | 663           | 593          | 524            | 351   | 487   | 150   | 97.8   | 82.6   |
| 21         | 50.0   | 73.8           | 467           | 436           | 665 *         | 620          | 522            | 438   | 480   | 153   | 94.6   | 78.5   |
| 22         | 50.0   | 66.9           | 482           | 413 *         | 570           | 628          | 444            | 358   | 385   | 146   | 93.9   | 75.0   |
| 23         | 48.0   | 62.5           | 537 *         | 401           | 513           | 574          | 561            | 385   | 317   | 143   | 94.6   | 68.5   |
| 24         | 50.0   | 60.9           | 583           | 512           | 575           | 539          | 721            | 438   | 319   | 143   | 94.5   | * 67.5 |
| 25         | 50.0   | 60.9           | 549           | 536           | 607           | 586          | 761            | 415   | 294   | 147   | 96.6   | 69.1   |
| 26         | 55.0   | * 63.0         | 528           | 489           | 604           | 598          | 725            | 344   | 290   | 141   | 91.9   | 72.2   |
| 27         | 55.0   | 60.7           | 398           | 335           | 578           | 623          | 853            | 261   | 336   | 138   | 92.5   | 72.6   |
| 28         | 52.0   | 63.6           | 390           | 314           | 581           | 708          | 930            | 728   | 289   | 138   | 98.9   | 71.5   |
| 29         | 52.0   | 508            | 284           | 532           | 976           | 924          | 642            | 269   | 138   | 103   | 72.7   |        |
| 30         | 51.0   | 463 *          | 277           | 566           | 976           | 820 *        | 708            | 240   | 138   | 98.9  | 73.7   |        |
| 31         | 52.0   | 519            | 608           | 729           | 886           | 729          | 132            |       |       |       |        | 74.8   |
| <b>Sum</b> |        | <b>5,486.1</b> | <b>12,223</b> | <b>18,484</b> | <b>17,829</b> | <b>5,626</b> | <b>2,426.3</b> |       |       |       |        |        |
| 1,754.0    |        | 13,031         | 16,239        | 20,836        | 17,841        | 17,841       | 3,255.6        |       |       |       |        |        |

### Current Year 1981

Period 1939-1981

| Month  | Extreme Gage Feet |      |        | Extreme Second-Feet |     | Average Second-Feet     | Total Acre-Feet | Acre-Feet |                           |         |          |
|--------|-------------------|------|--------|---------------------|-----|-------------------------|-----------------|-----------|---------------------------|---------|----------|
|        | High              | Low  | Day    | High                | Low |                         |                 | Average   | Maximum                   | Minimum |          |
| Jan.   | 3.97              | 3.83 | 19     | 61.0                | 23  | 48.0                    | 56.6            | 3,479     | 2,367                     | 15,594  |          |
| Feb.   | 7.10              | 3.58 | 11     | 546                 | 1   | 44.2                    | 196             | 10,882    | 4,847                     | 19,500  |          |
| Mar.   | 7.55              | 4.13 | 24     | 620                 | 1   | 106                     | 420             | 25,847    | 30,340                    | 50,100  |          |
| Apr.   | 7.66              | 5.20 | 3      | 674                 | 11  | 235                     | 407             | 24,244    | 29,696                    | 4,560   |          |
| May    | 7.96              | 4.91 | 17     | 770                 | 5   | 204                     | 524             | 32,210    | 26,961                    | 69,000  |          |
| June   | 9.28              | 5.95 | 29     | 1,090               | 11  | 337                     | 616             | 36,663    | 36,122                    | 5,990   |          |
| July   | 9.46              | 6.41 | 31     | 1,140               | 23  | 398                     | 672             | 41,328    | 42,668                    | 8,673   |          |
| Aug.   | 9.15              | 4.66 | 1      | 1,040               | 27  | 188                     | 575             | 35,363    | 42,094                    | 4,840   |          |
| Sept.  | 9.40              | 5.04 | 17     | 1,140               | 30  | 232                     | 595             | 35,387    | 27,865                    | 63,100  |          |
| Oct.   | 5.54              | 4.21 | 3      | 295                 | 31  | 130                     | 181             | 11,159    | 11,255                    | 39,000  |          |
| Nov.   | 4.43              | 4.12 | 2      | 134                 | 26  | 81.5                    | 109             | 6,457     | 6,639                     | 21,000  |          |
| Dec.   | 4.34              | 3.85 | 14     | 109                 | 24  | 67.3                    | 78.3            | 4,812     | 6,507                     | 25,500  |          |
| 9.46   |                   | 3.58 |        | 1,140               |     | 44.2                    | 370             | 267,831   | 267,361                   | 541,610 | 47,397.4 |
| Yearly |                   |      | Meters |                     |     | Cubic Meters per Second |                 |           | Thousands of Cubic Meters |         |          |
|        |                   |      | 2.88   | 1.09                |     | 32.3                    | 1.25            | 10.5      | 330,370                   | 329,788 | 668,076  |

\* Discharge measurement made on this day

† And other days

**RIO GRANDE BELOW AMERICAN DAM AT EL PASO, TEXAS  
AND CD. JUAREZ, CHIHUAHUA**

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the retaining wall of the Smelter Pump on the left bank of the river at latitude  $31^{\circ}46'35''$ , longitude  $106^{\circ}31'20''$ , and river mile 1,253.4 (2,017.1 km); 1.5 river miles (2.4 km) upstream from the International Dam, 3.1 river miles (5.0 km) upstream from the Paso del Norte Bridge between El Paso, Texas and Cd. Juarez, Chihuahua, and 0.6 river mile (1.0 km) downstream from the American Dam. The zero of the gage is 3,712.30 feet (1,131.51 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 35 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: June 1938 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The operation of the American Dam began June 2, 1938. At this dam, part of the flow passing the El Paso Gaging Station is diverted into the American Canal; and the remainder, including excess flood flows, passes this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 11,300 second-feet (320 m<sup>3</sup>/sec) on September 14, 1958 with a gage height of 14.50 feet (4.42 m). Min. occasionally no flow.

Average Flow in Second-Feet (Cubic Meters per Second)

| Daily   | Max. | 6,040 (171)  | May 20, 1942 | Min. 0           | Occasionally |
|---------|------|--------------|--------------|------------------|--------------|
| Monthly | Max. | 4,880 (138)  | May 1942     | Min. 0           | Occasionally |
| Yearly  | Max. | 1,510 (42.8) | 1942         | Min. 13.8 (0.39) | 1956         |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb.        | March        | April        | May   | June  | July  | Aug.         | Sept.       | Oct.  | Nov. | Dec. |
|------------|------|-------------|--------------|--------------|-------|-------|-------|--------------|-------------|-------|------|------|
| 1          | 1.0  | 0.9         | 1.7          | 157          | 172 * | 181   | 182   | 251          | 145         | * 3.6 | 0    | 0    |
| 2          | 1.0  | .9          | 1.8          | 194 *        | 157   | 205   | 185   | 193          | 118         | 3.2   | 0    | 0    |
| 3          | 1.0  | .9          | 1.7          | 218          | 155   | 198 * | 188   | 190          | 115 *       | 2.9   | 0    | 0    |
| 4          | 1.0  | .9          | 1.7          | 216          | 152 * | 196   | 184   | 192          | 118         | 2.5   | 0    | 0    |
| 5          | 1.0  | .9          | 1.9          | 213          | 150   | 204   | 190   | 196 *        | 123         | 2.2   | 0    | 0    |
| 6          | 1.0  | .9          | 1.9          | 213          | 149   | 198   | 190   | 196          | 123         | 1.8   | 0    | 0    |
| 7          | 1.0  | .9          | 2.0          | 210          | 147   | 206   | 186   | 202          | 362         | 1.4   | 0    | 0    |
| 8          | 1.0  | 3.2         | 1.9          | 208 *        | 147   | 200   | 192 * | 196          | 201         | 1.1   | 0    | 0    |
| 9          | 1.0  | 3.3         | 2.0          | 206          | 146   | 204   | 195   | 193          | 126         | .7    | 0    | 0    |
| 10         | .9   | 3.0         | 2.1          | 202          | 147   | 202 * | 199   | 202          | 122 *       | .4    | 0    | 0    |
| 11         | .9   | 2.8         | 2.2          | 207          | 146   | 209   | 197   | 196          | 136         | 0     | 0    | 0    |
| 12         | .9   | 2.8         | 2.2          | 210          | 146 * | 215   | 199   | 202          | 145         | 0     | 0    | 0    |
| 13         | .9   | 2.7         | 2.3          | 205          | 142   | 205   | 203   | 208 *        | 146         | 0     | 0    | 0    |
| 14         | .9   | 2.7         | 2.3          | 212          | 141   | 212   | 207   | 212          | 131 *       | 0     | 0    | 0    |
| 15         | .9   | 2.7         | 2.4          | 206 *        | 137 * | 211   | 205 * | 219          | 85.9        | 0     | 0    | 0    |
| 16         | .9   | 2.4         | 2.4          | 204          | 139   | 208   | 208   | 245          | 29.5        | 0     | 0    | 0    |
| 17         | .9   | 2.4         | 2.5          | 208          | 140   | 198   | 205   | 228          | 27.8        | 0     | 0    | 0    |
| 18         | .9   | 2.2         | 2.5          | 213          | 139   | 201   | 200   | 216          | 26.0        | 0     | 0    | 0    |
| 19         | * 9  | 2.2         | 2.6          | 214          | 140   | 200 * | 201   | 216          | 24.3        | 0     | 0    | 0    |
| 20         | .9   | 1.9         | 2.5          | 211 *        | 139   | 201   | 190   | 221          | 22.6        | 0     | 0    | 0    |
| 21         | .9   | 1.9         | 2.4          | 205          | 139 * | 201   | 199   | 213 *        | 20.9        | 0     | 0    | 0    |
| 22         | .9   | 1.8         | 2.5          | 204          | 138   | 201   | 199 * | 198          | 19.1        | 0     | 0    | 0    |
| 23         | .9   | 1.6         | 2.6          | 200          | 137   | 204   | 207   | 208          | 17.4        | 0     | 0    | 0    |
| 24         | .9   | 1.6         | 2.6          | 208 *        | 140   | 208   | 203   | 207          | 15.7        | 0     | 0    | 0    |
| 25         | .9   | 1.6         | 2.7          | 205          | 140   | 204 * | 198   | 208          | 14.0        | 0     | 0    | 0    |
| 26         | .9   | 1.5         | 2.9          | 201          | 140   | 201   | 198   | 207 *        | 12.2        | 0     | 0    | 0    |
| 27         | .9   | 1.4         | * 90.9       | 204 *        | 138 * | 199   | 198   | 208          | 10.5        | 0     | 0    | 0    |
| 28         | .9   | 1.5         | 148          | 213          | 138   | 203   | 197   | 220          | 8.8         | 0     | 0    | 0    |
| 29         | .9   | 160         | 203          | 137          | 138   | 281 * | 191   | 198          | 7.1         | 0     | 0    | 0    |
| 30         | .9   | 144 *       | 206          | 138          | 213   | 191   | 205   | 211 *        | 5.3         | 0     | 0    | 0    |
| 31         | .9   | 159         | 138          | 551          |       |       |       |              | 0           |       |      |      |
| <b>Sum</b> |      | <b>53.5</b> | <b>6,176</b> | <b>6,169</b> |       |       |       | <b>6,457</b> | <b>19.8</b> |       |      |      |
|            |      | 28.8        | 760.1        | 4,454        |       |       |       | 6,438        | 2,458.1     |       |      |      |

**Current Year 1981**

**Period 1939-1981**

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet            |     | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |         |           |
|---------------|-------------------|------|-----|--------------------------------|-----|---------------------|----------------------------------|-----------|---------|-----------|
|               | High              | Low  | Day | High                           | Low |                     |                                  | Average   | Maximum | Minimum   |
| Jan.          | 4.10              | 4.08 | 1 1 | 1.0                            | 1   | 0.9                 | 0.9                              | 57.1      | 3,724   | 12,000    |
| Feb.          | 4.27              | 4.08 | 9   | 3.8                            | 1 1 | .9                  | 1.9                              | 106       | 2,033   | 32,800    |
| Mar.          | 5.63              | 4.17 | 30  | 181                            | 1 1 | 1.7                 | 24.5                             | 1,508     | 3,111   | 81.9      |
| Apr.          | 5.82              | 5.38 | 4   | 226                            | 1   | 131                 | 206                              | 12,250    | 10,231  | 74,500    |
| May           | 5.71              | 5.41 | 1   | 199                            | 15  | 133                 | 144                              | 8,835     | 15,557  | 300,000   |
| June          | 6.26              | 5.46 | 29  | 473                            | 1   | 139                 | 206                              | 12,236    | 15,024  | 250,000   |
| July          | 7.53              | 5.55 | 31  | 1,580                          | 2   | 162                 | 208                              | 12,770    | 14,375  | 155,000   |
| Aug.          | 8.62              | 5.65 | 16  | 782                            | 4   | 189                 | 208                              | 12,807    | 13,655  | 114,000   |
| Sept.         | 8.65              | 4.22 | 7   | 789                            | 30  | 3.6                 | 81.9                             | 4,876     | 9,619   | 37.5      |
| Oct.          |                   |      | 1   | 0                              | 110 | 0                   | .6                               | 39.3      | 1,846   | 53.8      |
| Nov.          |                   |      |     | 0                              | 0   | 0                   | 0                                | 0         | 1,230   | 18.0      |
| Dec.          |                   |      |     | 0                              | 0   | 0                   | 0                                | 0         | 890     | 0         |
|               | 8.65              |      |     | 1,580                          |     | 0                   | 90.5                             | 65,484.4  | 91,295  | 1,093,553 |
| <b>Yearly</b> | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |     |                     | <b>Thousands of Cubic Meters</b> |           |         |           |
|               | 2.64              |      |     | 44.7                           |     | 0                   | 2.56                             | 80,774.9  | 112,610 | 1,348,898 |
|               |                   |      |     |                                |     |                     |                                  |           |         | 12,336    |

\* Discharge measurement made on this day

Mean daily

! And other days

**DIVERSIONS FROM THE RIO GRANDE**  
**ACEQUIA MADRE AT CD. JUAREZ, CHIHUAHUA**

**DESCRIPTION:** Bridge for making discharge measurements, gravity well, and water-stage recorder located on the right bank of the canal at Juarez, Chihuahua, latitude  $31^{\circ}45'40''$ , longitude  $106^{\circ}30'30''$ , about 260 feet (80 m) downstream from the canal intake at the International Dam at Juarez, Chihuahua, which is located at river mile 1,251.8 (2,014.7 km) and 2.1 river miles (3.4 km) downstream from the American Dam at El Paso, Texas.

**RECORDS:** Based on 135 discharge measurements during the year, 78 by the Mexican Section and 57 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: 1938 through 1981. These records, showing the water actually diverted by Mexico, do not necessarily reflect the quantities of water made available to Mexico in the bed of the river by the United States under terms of the Convention of 1906. Such quantities of water are included in the record of "Rio Grande below American Dam at El Paso, Texas." See page 11 in this Water Bulletin.

**REMARKS:** In 1981 all of the 60,262 acre-feet (74,332,000 m<sup>3</sup>) tabulated below were distributed to land irrigated in the first unit under the canal.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 480 second-feet (13.6 m<sup>3</sup>/sec) on July 21, 1944 with a gage height of 6.00 feet (1.83 m). Min. no flow during several months throughout the year.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                 |              |                 |                          |
|----------|-----------------|--------------|-----------------|--------------------------|
| Daily:   | Max. 339 (9.61) | May 10, 1942 | Min. 0          | Several months each year |
| Monthly: | Max. 283 (8.00) | May 1938     | Min. 0          | Several months each year |
| Yearly:  | Max. 116 (3.28) | 1942         | Min. 9.2 (0.26) | 1964                     |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb.  | March  | April | May   | June  | July  | Aug.    | Sept. | Oct. | Nov. | Dec. |
|------------|------|-------|--------|-------|-------|-------|-------|---------|-------|------|------|------|
| 1          | 0    | 0     | 0      | 141 * | 171 * | 170   | 192   | 158 *   | 143 * | 0    | 0    | 0    |
| 2          | 0    | 0     | 0      | 170 * | 154 * | 199 * | 190 * | 182     | 115 * | 0    | 0    | 0    |
| 3          | 0    | 0     | 0      | 191   | 149   | 199 * | 193 * | 184 *   | 116 * | 0    | 0    | 0    |
| 4          | 0    | 0     | 0      | 205 * | 189 * | 194   | 192   | 186 *   | 113 * | 0    | 0    | 0    |
| 5          | 0    | 0     | 0      | 201   | 144   | 201   | 191   | 189 *   | 123   | 0    | 0    | 0    |
| 6          | 0    | 0     | 0      | 203 * | 145   | 195 * | 195 * | 188     | 121   | 0    | 0    | 0    |
| 7          | 0    | 0     | 0      | 207 * | 142   | 200   | 194   | 160 *   | 0     | 0    | 0    | 0    |
| 8          | 0    | 0     | 0      | 208 * | 144 * | 198   | 195 * | 193     | 165   | 0    | 0    | 0    |
| 9          | 0    | 0     | 0      | 208 * | 143 * | 201   | 191 * | 182     | 123   | 0    | 0    | 0    |
| 10         | 0    | 0     | 0      | 206   | 142   | 197 * | 195   | 193     | 108 * | 0    | 0    | 0    |
| 11         | 0    | 0     | 0      | 208   | 143 * | 197   | 194 * | 181 *   | 106   | 0    | 0    | 0    |
| 12         | 0    | 0     | 0      | 209   | 143 * | 192 * | 194   | 138     | 138   | 0    | 0    | 0    |
| 13         | 0    | 0     | 0      | 208   | 139 * | 194   | 195 * | 178 *   | 142   | 0    | 0    | 0    |
| 14         | 0    | 0     | 0      | 210 * | 137 * | 200   | 200 * | 191     | 133 * | 0    | 0    | 0    |
| 15         | 0    | 0     | 0      | 209 * | 137 * | 205   | 202 * | 186 *   | 99.6  | 0    | 0    | 0    |
| 16         | 0    | 0     | 0      | 208   | 142 * | 203   | 197   | 182     | 16.2  | 0    | 0    | 0    |
| 17         | 0    | 0     | 0      | 208   | 144   | 166   | 185   | 171     | 0     | 0    | 0    | 0    |
| 18         | 0    | 0     | 0      | 211 * | 139 * | 174 * | 196 * | 189 *   | 0     | 0    | 0    | 0    |
| 19         | 0    | 0     | 0      | 212   | 137 * | 191 * | 189   | 197     | 0     | 0    | 0    | 0    |
| 20         | 0    | 0     | 0      | 208 * | 135 * | 199 * | 182 * | 196 *   | 0     | 0    | 0    | 0    |
| 21         | 0    | 0     | 0      | 205 * | 136 * | 198   | 197 * | 188 *   | 0     | 0    | 0    | 0    |
| 22         | 0    | 0     | 0      | 198 * | 138 * | 203 * | 195 * | 176     | 0     | 0    | 0    | 0    |
| 23         | 0    | 0     | 0      | 187   | 140   | 204   | 194 * | 180     | 0     | 0    | 0    | 0    |
| 24         | 0    | 0     | 0      | 193 * | 143   | 206   | 197 * | 184 *   | 0     | 0    | 0    | 0    |
| 25         | 0    | 0     | 0      | 195 * | 141   | 204 * | 192   | 184 *   | 0     | 0    | 0    | 0    |
| 26         | 0    | 0     | 0      | 196   | 138   | 202   | 192   | 182 *   | 0     | 0    | 0    | 0    |
| 27         | 0    | 0     | * 65.7 | 196 * | 137 * | 203 * | 194   | 180     | 0     | 0    | 0    | 0    |
| 28         | 0    | 0     | 0      | 126 * | 201   | 136   | 201   | 174     | 184 * | 0    | 0    | 0    |
| 29         | 0    | 0     | 134    | 196 * | 136   | 198 * | 188   | 179 *   | 0     | 0    | 0    | 0    |
| 30         | 0    | 0     | 130 *  | 197   | 138   | 164   | 182 * | 188     | 0     | 0    | 0    | 0    |
| 31         | 0    | 0     | 121    |       | 137   |       | 192   | 192 *   | 0     | 0    | 0    | 0    |
| <b>Sum</b> | 0    |       | 5,995  |       | 5,858 |       | 5,675 | 0       |       | 0    |      | 0    |
|            | 0    | 576.7 |        | 4,399 |       | 5,959 |       | 1,921.8 | 0     |      | 0    |      |

**Current Year 1981**

| Month         | Average Rainfall<br>Inches** |      | Extreme Second-Feet            |      | Average<br>Second-<br>Foot | Total<br>Acre-Feet               | Acre-Feet |         |          |
|---------------|------------------------------|------|--------------------------------|------|----------------------------|----------------------------------|-----------|---------|----------|
|               | 1938-1981                    | 1981 | Day                            | Day  |                            |                                  | Average   | Maximum | Minimum  |
| Jan.          | 0.40                         | 1.02 | 0                              | 0    | 0                          | 0                                | 0         | 0       | 0        |
| Feb.          | .35                          | .31  | 0                              | 0    | 0                          | 0                                | 0         | 0       | 0        |
| Mar.          | .24                          | .34  | 30                             | 144  | ! 1                        | 0                                | 18.7      | 1,144   | 1,178    |
| Apr.          | .18                          | .61  | ! 11                           | 213  | 1                          | 116                              | 200       | 11,889  | 7,999    |
| May           | .34                          | .67  | 1                              | 197  | 20                         | 134                              | 142       | 8,724   | 8,773    |
| June          | .65                          | .27  | 29                             | 216  | 17                         | 101                              | 195       | 11,617  | 8,340    |
| July          | 1.56                         | 1.77 | 16                             | 214  | 28                         | 120                              | 192       | 11,818  | 8,546    |
| Aug.          | 1.37                         | 2.91 | 20                             | 203  | 12                         | 106                              | 183       | 11,259  | 15,170   |
| Sept.         | 1.25                         | .98  | 7                              | 198  | ! 16                       | 0                                | 63.9      | 3,811   | 4,409    |
| Oct.          | .77                          | .65  | 0                              | 0    | 0                          | 0                                | 0         | 34.9    | 328      |
| Nov.          | .31                          | .15  | 0                              | 0    | 0                          | 0                                | 0         | 0       | 0        |
| Dec.          | .42                          | .06  | 0                              | 0    | 0                          | 0                                | 0         | 0       | 0        |
|               | 7.84                         | 9.74 |                                | 216  |                            | 0                                | 83.3      | 60,262  | 47,609.9 |
| <b>Yearly</b> | <b>Millimeters</b>           |      | <b>Cubic Meters per Second</b> |      |                            | <b>Thousands of Cubic Meters</b> |           |         |          |
|               | 199                          | 247  |                                | 6.13 | 0                          | 2.36                             | 74,332    | 58,728  | 103,511  |
|               |                              |      |                                |      |                            |                                  |           |         | 8,207    |

\* Discharge measurement made on this day      ! And other days

\*\* Average for valley floor in United States and Mexico from El Paso to Clint Station

**RIO GRANDE NEAR CLINT, TEXAS  
AND SAN AGUSTIN, CHIHUAHUA**

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank of the rectified channel of the Rio Grande at latitude  $31^{\circ}32'00''$ , longitude  $106^{\circ}14'35''$ , and river mile 1,226.9 (1,974.5 km); 0.7 river mile (1.1 km) downstream from the Riverside Canal Wasteway No. 2, about 4 miles (6.4 km) south southwest of Clint, Texas, and 27.1 river miles (43.5 km) downstream from the American Dam at El Paso, Texas.

The zero of the gage is 3,608.99 feet (1,100.02 m) above mean sea level, U. S. C. & G. S. datum.  
**RECORDS:** Based on 19 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: August 17, 1938 through 1981. Records prior to 1976 were published under the title "Rio Grande - Island Station near Clint, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 7,050 second-feet (200 m<sup>3</sup>/sec) on September 14, 1958 with a gage height of 15.80 feet (4.82 m). Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |              |                 |            |
|----------|-------------------|--------------|-----------------|------------|
| Daily:   | Max. 6,140 (174)  | May 19, 1942 | Min. 0          | Frequently |
| Monthly: | Max. 4,880 (138)  | May 1942     | Min. 0          | Frequently |
| Yearly:  | Max. 1,490 (42.2) | 1942         | Min. 0.3 (0.01) | 1956       |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb.  | March | April | May  | June   | July  | Aug.    | Sept. | Oct.    | Nov.  | Dec.    |
|------------|------|-------|-------|-------|------|--------|-------|---------|-------|---------|-------|---------|
| 1          | 9.5  | 1.8   | 0     | 0     | 1.1  | 0      | 179   | 448     | * 0.7 | 2.5     | 55.1  | 105     |
| 2          | 7.8  | 1.8   | 0     | 0     | 39.9 | 46.6   | 196   | 211     | * .4  | 2.5     | 86.2  | 99.6    |
| 3          | 7.8  | 1.8   | 0     | 0     | 112  | 112    | 114   | 252     | .4    | 112     | 97.1  | 99.6    |
| 4          | 7.8  | 1.8   | * 1.4 | 0     | 206  | 57.6   | 13.4  | 196     | .4    | 221     | 105   | 101 *   |
| 5          | 5.3  | * 1.8 | .7    | 0     | 40.6 | 28.6   | 23.7  | 120     | .4    | 221     | 105   | 99.6    |
| 6          | 1.8  | 1.8   | 0     | 0     | 3.9  | 66.7   | 141 * | * 16.2  | .4    | 221     | 106 * | 99.2    |
| 7          | 1.8  | 1.8   | 0     | 0     | 3.9  | 6.4    | 109   | 94.3    | 69.6  | 221     | 108   | 99.2    |
| 8          | 1.8  | 25.8  | 0     | 0     | 3.9  | * 47.7 | 51.2  | 274     | 239   | 217 *   | 102   | 98.9    |
| 9          | 1.8  | 21.2  | 0     | 0     | 3.9  | 10.6   | 18.4  | 228     | 280   | 198     | 99.2  | 96.4    |
| 10         | 1.8  | 4.6   | 0     | 0     | 3.2  | 9.2    | 10.6  | 318     | 207   | 196     | 102   | 96.1    |
| 11         | 1.8  | 3.2   | 0     | 0     | 1.1  | 6.0    | 5.3   | 291     | 67.8  | 195     | 102   | 98.5    |
| 12         | 1.8  | 2.8   | 0     | 0     | 0    | 1.1    | 8.8   | 388     | 14.1  | 186     | 102   | 98.5    |
| 13         | 1.8  | 2.5   | 0     | 0     | * 0  | 0      | 106   | 351     | 18.0  | 162     | 102   | 98.2    |
| 14         | 1.8  | 2.1   | 0     | 0     | 1.8  | 0      | 29.0  | 175     | 20.5  | 127     | 96.8  | 95.7    |
| 15         | 1.8  | 1.4   | 0     | 0     | 2.8  | 2.8    | 14.8  | 49.1    | 23.0  | 117     | 102   | 97.8    |
| 16         | 1.8  | 1.1   | 0     | * 0   | 2.1  | 0      | 5.3   | 89.0    | 69.2  | 115     | 96.8  | * 97.8  |
| 17         | 1.8  | .7    | 3.5   | 0     | 2.1  | 36.0   | 95.0  | 350     | 3.2   | 104     | 96.8  | 96.4    |
| 18         | 1.8  | .4    | 10.6  | 0     | 1.8  | 17.0   | 10.6  | 43.1    | 2.5   | 98.5    | 94.3  | 92.5    |
| 19         | 1.8  | 0     | * 3.5 | 0     | 2.1  | 4.9    | 7.1   | 52.3    | 2.5   | 91.8    | 97.1  | 89.0    |
| 20         | 1.8  | 0     | 0     | *     | 48.7 | .4     | 7.1   | 14.1    | 2.5   | 81.9    | 94.6  | 87.6    |
| 21         | 1.8  | 0     | 0     | 0     | 25.1 | 7.8    | 7.1   | 3.2     | 2.5   | 74.9    | 99.6  | 86.2    |
| 22         | 1.8  | 0     | 0     | 0     | 2.8  | 32.8   | 5.3   | 6.7     | 2.5   | 74.9    | 99.6  | 85.1    |
| 23         | 1.8  | 0     | 0     | 4.2   | 2.8  | .4     | 1.8   | .7      | 2.5   | 66.4    | 97.1  | 83.7    |
| 24         | 1.8  | 0     | 0     | 14.8  | 2.8  | * 0    | 0     | 17.0    | 2.5   | 57.9    | 94.6  | 82.3    |
| 25         | 1.8  | 0     | 0     | 18.4  | 1.1  | .4     | 0     | 2.5     | 2.5   | 54.0    | 94.6  | 80.9    |
| 26         | 1.8  | 0     | 0     | 31.4  | .7   | .4     | 0     | * 2.1   | 2.5   | 47.3    | 94.6  | 79.5    |
| 27         | 1.8  | 0     | 0     | 27.5  | .4   | 0      | 0     | 2.1     | 2.5   | 41.3    | 94.6  | 78.4    |
| 28         | 1.8  | 0     | 0     | 1.4   | .7   | 0      | 105   | 1.8     | 2.5   | * 36.0  | 97.1  | 77.0    |
| 29         | 1.8  | 0     | 0     | 0     | .7   | 13.8   | 238   | 1.8     | 2.5   | 37.1    | 108   | 75.6    |
| 30         | 1.8  | 0     | 0     | 2.1   | .4   | 190    | 221   | 1.4     | 2.5   | 38.5    | 111   | 71.0    |
| 31         | 1.8  | 0     | 0     | 0     | .4   | 238    | 1.1   | 1.1     | 2.5   | 37.8    | 66.0  |         |
| <b>Sum</b> |      | 78.4  |       | 99.8  |      | 699.2  |       | 4,000.5 |       | 3,456.3 |       | 2,812.3 |
|            |      | 85.0  |       | 19.7  |      | 518.8  |       | 1,961.5 |       | 1,046.6 |       | 2,940.8 |

**Current Year 1981**

**Period 1939-1981**

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |         |           |
|---------------|-------------------|------|-----|--------------------------------|------|---------------------|----------------------------------|-----------|---------|-----------|
|               | High              | Low  | Day | High                           | Low  |                     |                                  | Average   | Maximum | Minimum   |
| Jan.          |                   |      | 1   | 0                              | 9.5  | 1.6                 | 0                                | 2.8       | 167     | 3,671     |
| Feb.          |                   |      | 8   | 0                              | 25.8 | 119                 | 0                                | 2.8       | 155     | 2,382     |
| Mar.          |                   |      | 18  | 0                              | 10.6 | 1.0                 | .7                               | 39.2      | 1,910   | 21,000    |
| Apr.          |                   |      | 26  | 0                              | 31.4 | 1.1                 | 0                                | 3.2       | 199     | 2,842     |
| May           |                   |      | 4   | 0                              | 206  | 112                 | 0                                | 16.6      | 1,027   | 8,180     |
| June          | 11.38             |      | 30  | 290                            | 1.1  | 0                   | 23.3                             | 1,386     | 7,040   | 299,800   |
| July          | 13.06             |      | 29  | 724                            | 121  | 0                   | 63.2                             | 7,292     | 118,500 | 0         |
| Aug.          | 14.11             |      | 12  | 1,160                          | 116  | 0                   | 129                              | 7,934     | 6,872   | 0         |
| Sept.         | 11.75             | 8.23 | 7   | 381                            | 1.2  | .4                  | 35.3                             | 2,075     | 7,321   | 99,400    |
| Oct.          | 10.10             | 8.23 | 4   | 221                            | 1.1  | 2.5                 | 112                              | 6,856     | 119,200 | 0         |
| Nov.          | 9.97              | 8.63 | 1   | 121                            | 1    | 35.0                | 98.2                             | 5,835     | 3,616   | 42,800    |
| Dec.          | 9.78              |      | 1   | 108                            | 31   | 0                   | 66.0                             | 90.8      | 1,138   | 7,270     |
|               | 14.11             |      |     | 1,160                          |      | 0                   | 48.6                             | 35,151.2  | 54,096  | 1,079,340 |
| <b>Yearly</b> | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |      |                     | <b>Thousands of Cubic Meters</b> |           |         |           |
|               | 4.30              |      |     | 32.8                           |      | 0                   | 1.37                             | 43,353.4  | 66,729  | 1,331,366 |

\* Discharge measurement made on this day

! And other days

Ø Mean daily

**RIO GRANDE NEAR ACALA, TEXAS  
AND PRAXEDES GUERRERO, CHIHUAHUA**

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank of the rectified channel of the Rio Grande at latitude 31°22'50", longitude 105°59'10", and river mile 1,206.7 (1,942.0 km); 0.8 river mile (1.3 km) downstream from the El Paso-Hudspeth County Line, 5.5 miles (8.9 km) northwest of Acala, Texas, about 8 miles (12.9 km) southeast of Tornillo, Texas, and 47.2 river miles (76.0 km) downstream from the American Dam at El Paso, Texas. The zero of the gage is 3,547.59 feet (1,081.31 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 17 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1938 through 1981. Records prior to 1976 were published under the title "Rio Grande - County Line Station near Acala, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 6,340 second-feet (180 m<sup>3</sup>/sec) on May 19, 1942 with a gage height of 8.66 feet (2.64 m). Min. frequently no flow.

|          |      |              |     |          | Average Flow in Second-Feet (Cubic Meters per Second) |  |  |  |  |      |   |             |  |  |
|----------|------|--------------|-----|----------|---|--|--|--|--|------|---|-------------|--|--|
| Daily:   | Max. | 6,180 (175)  | May | 18, 1942 |   |  |  |  |  | Min. | 0 | Frequently  |  |  |
| Monthly: | Max. | 4,920 (139)  | May | 1942     |   |  |  |  |  | Min. | 0 | 1956 & 1964 |  |  |
| Yearly:  | Max. | 1,720 (48.7) |     |          |   |  |  |  |  |      |   |             |  |  |
|          |      |              |     |          |   |  |  |  |  |      |   |             |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb. | March | April   | May   | June    | July  | Aug.    | Sept. | Oct.    | Nov. | Dec.   |  |
|------------|------|------|-------|---------|-------|---------|-------|---------|-------|---------|------|--------|--|
| 1          | 0    | 0    | 0     | 5.6     | 12.7  | 11.3    | 106   | 224     | 5.7   | 6.4     | 88.3 | 86.5   |  |
| 2          | 0    | 0    | 0     | 7.1     | 16.6  | 12.0    | 118 * | 196     | 3.9   | 3.9     | 113  | 74.2   |  |
| 3          | 0    | 0    | 0     | 0       | 153   | 30.7    | 111   | 169     | 3.9   | 8.8     | 101  | 75.9   |  |
| 4          | 0    | 0    | 0     | 0       | 207   | *       | 79.8  | 103     | 196   | 28.6    | 96.1 | * 64.6 |  |
| 5          | 0    | 0    | 0     | 0       | 192   | 62.2    | 98.5  | 147     | 3.9   | 134     | 98.2 | 47.0   |  |
| 6          | 0    | 0    | 0     | 2.8     | 30.7  | 41.3    | 81.2  | *       | 56.2  | 47.0    | 167  | * 89.3 |  |
| 7          | 0    | 0    | 0     | 2.8     | 15.5  | 75.2    | 78.4  | 31.4    | 175   | 157     | 92.5 | 45.9   |  |
| 8          | *    | 0    | 0     | 2.8     | 14.1  | 92.9    | 40.3  | 270     | 403   | 160     | 88.6 | 48.7   |  |
| 9          | 0    | 0    | 0     | 2.8     | 12.4  | 35.7    | 30.0  | 554     | 600   | 158 *   | 84.0 | 44.8   |  |
| 10         | 0    | 0    | 0     | 3.2     | 9.9   | 26.1    | 23.7  | 438     | 636   | 161     | 116  | 33.9   |  |
| 11         | 0    | 0    | 0     | 3.2     | 8.1   | 17.7    | 20.5  | 459     | 466   | 159     | 94.3 | 25.4   |  |
| 12         | 0    | 0    | 0     | 4.6     | 0     | 14.1    | 28.6  | 523     | 330   | 160     | 91.1 | 18.0   |  |
| 13         | 0    | 0    | 0     | 4.6     | 0     | 13.4    | 49.4  | 417     | 285   | 157     | 83.3 | 11.7   |  |
| 14         | 0    | 0    | 0     | 4.6     | 0     | 12.0    | 29.0  | 448     | 202   | 102     | 78.4 | 5.7    |  |
| 15         | 0    | 0    | 0     | 4.6     | 0     | 11.3    | 16.2  | 245     | 257   | 71.7    | 80.2 | 3.5    |  |
| 16         | 0    | 0    | 0     | *       | 3.2   | 0       | 10.2  | 12.4    | 158   | 342     | 67.8 | 75.6   |  |
| 17         | 0    | 0    | 0     | *       | 3.2   | 0       | 9.2   | 25.4    | 276   | 228     | 50.5 | 2.1    |  |
| 18         | 0    | 0    | 0     | *       | 3.9   | 9.5     | 8.5   | 30.0    | 262   | 143     | 50.9 | 2.1    |  |
| 19         | 0    | 0    | *     | 0       | 2.8   | 10.6    | 8.5   | 10.6    | 151   | 121     | 49.1 | 2.1    |  |
| 20         | 7.1  | 0    | 0     | *       | 2.8   | *       | 11.3  | 7.8     | 22.6  | 165     | 136  | 43.8   |  |
| 21         | 7.1  | 0    | 0     | 2.8     | 31.8  | 6.7     | 13.8  | 110     | 173   | 44.5    | 78.8 | 2.1    |  |
| 22         | 7.1  | 0    | 0     | 2.8     | 53.0  | 6.7     | 5.3   | 117     | 170   | 44.8    | 76.3 | 2.1    |  |
| 23         | 7.1  | 0    | 0     | 2.8     | 55.4  | 7.8     | 2.5   | 101     | 117 * | 45.2    | 73.8 | 2.1    |  |
| 24         | 6.4  | 0    | 0     | 0       | 29.0  | *       | 7.4   | *       | 1.1   | 108     | 85.8 | 51.9   |  |
| 25         | 6.4  | 0    | 0     | 4.6     | 60.4  | 7.4     | 1.1   | 58.3    | 78.8  | 50.5    | 61.8 | 2.1    |  |
| 26         | 6.4  | 0    | 0     | 31.4    | 36.4  | 6.0     | 1.1   | *       | 19.1  | 90.0    | *    | 55.1   |  |
| 27         | 0    | 0    | 0     | 109     | 15.5  | 4.9     | .4    | *       | 15.5  | 105     | 77.3 | 61.4   |  |
| 28         | 0    | 0    | 0     | 73.8    | 12.7  | 4.9     | 0     | 13.4    | 137   | 61.4    | 67.8 | 2.1    |  |
| 29         | 0    | 0    | 0     | 29.7    | 11.7  | 9.2     | 34.6  | 11.7    | 103   | 68.2    | 79.5 | 2.1    |  |
| 30         | 0    | 0    | 0     | 12.4    | 11.3  | 27.9    | 121   | 8.5     | 80.9  | 74.5    | 86.9 | 2.1    |  |
| 31         | 0    | 0    | 0     | 10.6    | 96.1  |         |       | 7.8     | 83.7  |         |      |        |  |
| <b>Sum</b> | 0    | 0    | 333.9 |         | 668.8 |         |       | 5,955.9 |       | 2,553.6 |      | 665.0  |  |
|            | 47.6 | 0    |       | 1,031.2 |       | 1,311.8 |       | 5,532.8 |       | 2,488.8 |      |        |  |

Period 1938-1981

| Month  | Extreme Gage Feet |       |     | Extreme Second-Feet |                         | Average Second-Feet | Total Acre-Feet | Acre-Feet |                           |         |  |  |
|--------|-------------------|-------|-----|---------------------|-------------------------|---------------------|-----------------|-----------|---------------------------|---------|--|--|
|        | High              |       | Low | High                |                         |                     |                 | Average   | Maximum                   | Minimum |  |  |
|        | High              | Low   |     | Day                 | Day                     |                     |                 | Day       | Day                       | Day     |  |  |
| Jan.   |                   |       |     | 20                  | 0                       | 7.1                 | 1 1             | 0         | 1.4                       | 94.0    |  |  |
| Feb.   |                   |       |     |                     | 0                       |                     |                 | 0         | 0                         | 47,900  |  |  |
| Mar.   |                   |       |     |                     | 0                       |                     |                 | 0         | 0                         | 38,900  |  |  |
| Apr.   | 3.25              |       |     | 27                  | 221                     | ! 3                 | 0               | 11.3      | 662                       | 5,268   |  |  |
| May    | 3.74              |       |     | 4                   | 272                     | 112                 | 0               | 33.2      | 2,046                     | 10,170  |  |  |
| June   | 1.71              | - .89 |     | 8                   | 106                     | 127                 | 4.9             | 22.2      | 1,325                     | 8,985   |  |  |
| July   | 2.92              |       |     | 30                  | 187                     | 28                  | 0               | 42.4      | 2,603                     | 9,616   |  |  |
| Aug.   | 6.40              |       |     | 12                  | 752                     | 31                  | 7.8             | 192       | 11,812                    | 9,268   |  |  |
| Sept.  | 5.25              |       |     | ! 9                 | 653                     | ! 2                 | 0               | 3.9       | 184                       | 11,803  |  |  |
| Oct.   | 1.48              |       |     | 5                   | 177                     | 2                   | 3.9             | 82.3      | 5,065                     | 140,000 |  |  |
| Nov.   | .86               | -.03  |     | 2                   | 128                     | 27                  | 5.1             | 83.0      | 4,937                     | 7,171   |  |  |
| Dec.   | .46               |       |     | 1                   | 89.3                    | 116                 | 2.1             | 21.5      | 1,320                     | 4,612   |  |  |
|        | 6.40              |       |     |                     | 752                     |                     | 0               | 56.4      | 40,837                    | 4,994   |  |  |
| Yearly | Meters            |       |     |                     | Cubic Meters per Second |                     |                 |           | Thousands of Cubic Meters |         |  |  |
|        | 1.95              |       |     |                     | 21.3                    |                     | 0               | 1.60      | 50,375                    | 103,807 |  |  |
|        |                   |       |     |                     |                         |                     |                 |           | 1,538,791                 | 0       |  |  |

\* Discharge measurement made on this day

0 Mean daily

! And other days

**RIO GRANDE AT FORT QUITMAN, TEXAS  
NEAR COLONIA LUIS LEON, CHIHUAHUA**

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank of the rectified channel of the Rio Grande at latitude  $31^{\circ}05'10''$ , longitude  $105^{\circ}36'30''$ , and river mile 1,173.2 (1,888.1 km); 1.5 river miles (2.4 km) downstream from Old Fort Quitman, 9 miles (14.5 km) southeast of Esperanza, Texas, and 17.5 miles (28.2 km) southeast of McNary, Texas. The zero of the gage is 3,450.57 feet (1,051.73 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 22 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1889 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS\*\*:** Momentary: Max. 10,600 second-feet ( $300 \text{ m}^3/\text{sec}$ ) October 5, 1946 with a gage height of 10.00 feet (3.05 m). Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                   |              |                 |                           |
|----------|-------------------|--------------|-----------------|---------------------------|
| Daily:   | Max. 5,890 (167)  | May 19, 1942 | Min. 0          | Frequently                |
| Monthly: | Max. 5,030 (142)  | May 1942     | Min. 0          | Several months since 1951 |
| Yearly:  | Max. 1,750 (49.6) | 1942         | Min. 2.3 (0.07) | 1965                      |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.   | March  | April  | May     | June   | July   | Aug.     | Sept.   | Oct.  | Nov.    | Dec.  |
|------------|---------|--------|--------|--------|---------|--------|--------|----------|---------|-------|---------|-------|
| 1          | 83.0    | 44.8   | 32.8   | 23.3   | 62.5    | 40.6   | 51.6   | 200      | 49.1    | 236   | 124     | 125   |
| 2          | 78.0    | 42.4   | 32.8   | 23.0   | 70.3    | 40.6   | 50.9   | 205      | 45.6    | 229   | 125     | 124   |
| 3          | 73.8    | 42.7   | 32.8   | * 22.6 | 109     | 37.8   | 53.3   | 235 *    | 38.8    | 225   | 133     | 124   |
| 4          | 73.8    | 40.6   | * 32.8 | 19.4   | 191     | * 32.1 | 55.4   | 350      | 32.5    | 221   | 141     | 123 * |
| 5          | 74.2    | * 41.0 | 31.1   | 21.5   | 219     | 63.9   | 57.9   | 456      | 29.3    | 207   | 142     | 123 * |
| 6          | 69.6    | 40.3   | 31.1   | 21.5   | 135     | 83.0   | 60.7   | 316      | 23.0    | 204   | 143 *   | 124   |
| 7          | 69.9    | 39.9   | 31.4   | 25.4   | 93.2    | 87.9   | 60.0   | 297      | 57.2    | 334   | 142     | 124   |
| 8          | 69.9    | 39.2   | 31.4   | 25.4   | * 88.3  | 105    | 62.5   | 297      | 236     | 267   | 142     | 124   |
| 9          | 66.0    | 38.8   | 33.9   | 25.8   | 57.9    | 104    | 61.8   | 597      | 473     | 280 * | 141     | 118   |
| 10         | 66.4    | 38.1   | 34.3   | 23.7   | 54.4    | 52.6   | 61.4   | 720      | 664     | 272   | 133     | 118   |
| 11         | 66.4    | 37.8   | 32.1   | 22.6   | 57.6    | 33.9   | 54.7   | 1,370    | 724     | 270   | 139     | 118   |
| 12         | 66.7    | 37.1   | 34.6   | 22.6   | 57.6    | 31.1   | 54.0   | 1,060    | 523     | 257   | 132     | 119   |
| 13         | 62.9    | 36.4   | 34.6   | 21.2   | 47.3    | 31.1   | 53.3   | 862      | 341     | 255   | 131     | 112   |
| 14         | 63.2    | 36.0   | 32.8   | 23.0   | 41.3    | 28.3   | 53.0   | 791      | 296     | 240   | 130     | 113   |
| 15         | 63.2    | 35.3   | 33.2   | 24.7   | 50.1    | 26.1   | 52.6   | 710      | 293     | 231   | 130     | 113   |
| 16         | * 63.6  | 35.0   | 33.2   | * 23.7 | 43.8    | 24.0   | 48.7   | 544      | 305     | 219   | 129     | 113 * |
| 17         | 63.9    | 34.3   | 27.5   | 25.1   | 43.4    | 25.8   | 42.4   | 484      | 364     | 207   | 128     | 114   |
| 18         | 64.3    | 33.9   | 27.5   | 27.2   | 40.6    | 23.7   | 39.6   | 731      | 285     | 197   | 127     | 114   |
| 19         | 60.7    | * 33.2 | * 33.9 | 27.2   | 35.0    | 23.7   | 39.2   | 399      | 268     | 186   | 126     | 114   |
| 20         | 61.1    | 33.2   | 31.4   | 29.0   | * 32.5  | 25.4   | 36.0   | 215      | 266     | 167   | 126     | 115   |
| 21         | 61.4    | 33.2   | 31.1   | 27.2   | 34.6    | 21.2   | 35.3   | 168      | 385     | 157   | 125     | 115   |
| 22         | 61.4    | 33.2   | 26.8   | 27.2   | 37.1    | 21.2   | 35.0   | 160      | 385     | 148   | 124     | 109   |
| 23         | 57.9    | 33.2   | 28.6   | 28.6   | 39.6    | 19.1   | 32.5   | 144      | 285 *   | 138   | 124     | 109   |
| 24         | 54.7    | 33.2   | 30.0   | 37.4   | 59.3    | * 17.0 | * 31.8 | 130      | 263     | 136   | 123     | 110   |
| 25         | 51.9    | 33.2   | 29.7   | 35.0   | 59.0    | 19.4   | 31.8   | 115      | 256     | 120   | 122     | 110   |
| 26         | 52.3    | 32.8   | 27.5   | 37.4   | 71.0    | 21.5   | 31.8   | 101      | 250     | 112 * | 121     | 111   |
| 27         | 49.4    | 32.8   | 25.1   | 41.0   | 62.5    | 43.1   | 33.9   | * 80.9   | 244     | 113   | 121     | 111   |
| 28         | 46.6    | 32.8   | 24.7   | 105    | 44.8    | 34.6   | 33.9   | 70.3     | 238     | 114   | 120     | 105   |
| 29         | 47.0    |        | 23.0   | 88.6   | 44.5    | 39.2   | 154    | 66.0     | 244     | 115   | 119     | 106   |
| 30         | 44.5    |        | 22.6   | 58.6   | 35.7    | 49.4   | 181    | 56.9     | 227     | 116   | 119     | 99.9  |
| 31         | 44.5    |        | 23.7   |        | 32.8    |        |        | 190      | 52.6    | 123   |         | 100   |
| <b>Sum</b> | 1,024.4 |        | 963.9  |        | 1,206.3 |        |        | 11,983.7 | 6,096   |       | 3,557.9 |       |
|            | 1,932.2 |        | 938.0  |        | 2,050.7 |        |        | 1,840.0  | 8,090.5 |       | 3,882   |       |

**Current Year 1981**

**Period 1938-1981**

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet     |     |      | Average Second-Feet | Total Acre-Feet           | Acre-Feet |           |         |
|---------------|-------------------|------|-----|-------------------------|-----|------|---------------------|---------------------------|-----------|-----------|---------|
|               | High              | Low  | Day | High                    | Low | Day  |                     |                           | Average   | Maximum   | Minimum |
| Jan.          | 5.02              | 4.66 | 1   | 83.0                    | 130 | 44.5 | 62.5                | 3,833                     | 5,666     | 20,900    | 0       |
| Feb.          | 4.66              |      | 1   | 44.8                    | 126 | 32.8 | 36.7                | 2,032                     | 4,753     | 50,100    | 0       |
| Mar.          | 4.63              | 4.36 | 12  | 41.7                    | 30  | 22.6 | 30.4                | 1,861                     | 3,721     | 38,900    | 0       |
| Apr.          | 5.18              | 4.30 | 28  | 110                     | 4   | 19.4 | 32.1                | 1,911                     | 4,621     | 77,000    | 0       |
| May           | 5.80              | 4.49 | 5   | 273                     | 20  | 28.3 | 66.0                | 4,068                     | 10,871    | 309,000   | 0       |
| June          | 5.35              | 4.40 | 27  | 142                     | 124 | 17.0 | 40.3                | 2,392                     | 9,663     | 240,000   | 0       |
| July          | 7.41              | 4.49 | 29  | 1,010                   | 29  | 29.7 | 59.3                | 3,649                     | 11,182    | 140,000   | 3.8     |
| Aug.          | 9.71              | 4.95 | 11  | 2,480                   | 31  | 52.6 | 385                 | 23,768                    | 11,768    | 127,000   | 16.7    |
| Sept.         | 6.92              | 4.79 | 11  | 752                     | 7   | 20.1 | 270                 | 16,048                    | 15,667    | 147,000   | 0       |
| Oct.          | 6.07              | 5.25 | 7   | 388                     | 126 | 112  | 197                 | 12,093                    | 11,344    | 66,500    | 0       |
| Nov.          | 5.35              | 5.28 | 6   | 143                     | 29  | 119  | 130                 | 7,703                     | 7,316     | 24,500    | 0       |
| Dec.          | 5.35              | 5.18 | 1   | 125                     | 30  | 99.9 | 115                 | 7,056                     | 7,339     | 31,000    | 0       |
| <b>Yearly</b> | 9.71              | 4.30 |     | 2,480                   |     | 17.0 | 119                 | 86,414                    | 103,911   | 1,270,400 | 1,662.3 |
|               | Meters            |      |     | Cubic Meters per Second |     |      |                     | Thousands of Cubic Meters |           |           |         |
|               | 2.96              | 1.31 |     | 70.1                    |     | 0.48 | 3.38                | 106,592                   | 128,174   | 1,567,038 | 2,050   |

\*\* Period 1924-1981      \* Discharge measurement made on this day      0 Mean daily

I And other days

**RIO GRANDE NEAR CANDELARIA, TEXAS  
AND SAN ANTONIO DEL BRAVO, CHIHUAHUA**

**DESCRIPTION:** Cableway, gravity well, and digital recorder located on the left bank of the Rio Grande at San Antonio Diversion Dam, latitude  $30^{\circ}10'30''$ , longitude  $104^{\circ}41'10''$  and river mile 1,038.8 (1,671.8 km), 0.5 river mile (0.8 km) upstream from Capote Creek and about 2.5 miles (4.0 km) north of Candelaria, Texas and San Antonio, Chihuahua. The zero of the gage is 2,857.96 feet (871.11 m) above mean sea level, U.S.C. & G.S. datum.

**RECORDS:** Based on 39 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: November 19, 1975 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the flow at this station. An auxiliary well, located 300 feet (91 m) upstream, is used to record extreme low flows. Prior to June 1979 the zero of the gage was 2,857.84 feet (871.07 m) above mean sea level, U.S.C. & G.S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 19,800 second-feet ( $561 \text{ m}^3/\text{sec}$ ) on September 30, 1978 with a gage height of 10.86 feet (3.31 m). Min. frequently no flow.

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.   | March  | April  | May     | June   | July     | Aug.    | Sept.    | Oct.  | Nov.    | Dec.   |
|------------|---------|--------|--------|--------|---------|--------|----------|---------|----------|-------|---------|--------|
| 1          | 84.8    | 73.5   | 53.3   | 14.1   | * 10.6  | * 31.8 | * 8.8    | 113     | 145      | 187 * | 117     | * 92.9 |
| 2          | 84.8    | 73.8   | 38.1   | * 13.4 | 8.1     | 47.7   | 59.3     | 91.1    | 117 *    | 174   | 113     | 94.3   |
| 3          | 84.8    | 66.4   | 35.3   | 10.6   | 43.1    | 6.0    | 22.6     | 154     | 71.3     | 162   | 111 *   | 95.3   |
| 4          | 80.2    | * 62.9 | * 38.1 | 7.4    | 36.7    | 4.2    | 48.7     | 169 *   | 60.4     | 240   | 109     | * 96.4 |
| 5          | 80.2    | 51.9   | 35.3   | 5.3    | 15.5    | 205 *  | 82.6     | 115     | 77.3     | 879   | 107     | 101    |
| 6          | * 80.2  | 49.1   | 32.5   | 2.5    | 81.2    | 145    | 67.5     | 123     | 221      | 547   | 100     | 105    |
| 7          | 75.6    | 42.4   | 29.7   | 1.8    | 63.6    | 52.3   | 39.2     | 131     | 551      | 424 * | 99.6    | 110    |
| 8          | 75.2    | 39.9   | 29.3   | 7.8    | 44.1    | 24.0   | 47.3     | 526     | 540      | 491   | 109     | 109    |
| 9          | 74.9    | 37.1   | 26.8   | 6.7    | 35.0    | 16.6   | 54.0     | 282     | 530      | 643   | 113     | 109 *  |
| 10         | 74.5    | 40.3   | 26.5   | 2.5    | 96.1    | * 14.8 | 76.6     | 284     | 523 *    | 537   | 111     | 110    |
| 11         | 73.8    | 32.1   | 26.5   | 1.1    | 55.1    | 14.8   | 87.2     | 321     | 537      | 314   | 109     | 110    |
| 12         | 69.6    | 32.1   | 26.1   | 1.1    | 53.0    | 18.0   | 68.2     | 629     | 551      | 374   | 108     | 108    |
| 13         | 61.4    | 32.1   | 23.3   | * .7   | 43.4    | 25.8   | 66.7     | 1,500   | 509 *    | 333 * | 105 *   | 105    |
| 14         | 57.6    | 30.0   | 23.3   | .7     | 30.0    | 128    | 64.3     | 1,580 * | 459      | 328   | 100     | 99.6   |
| 15         | * 50.5  | 30.0   | 25.4   | .4     | 17.0    | 51.9   | 49.8     | 1,610   | 396      | 303   | 100     | 99.9   |
| 16         | 53.3    | 30.0   | * 25.1 | * 0    | 17.0    | 66.4   | 125      | 1,050   | 353      | 291   | 102     | * 99.9 |
| 17         | 49.8    | 30.0   | 25.4   | 0      | 41.0    | * 18.0 | 72.7     | 901     | 385      | 253   | 106     | 99.2   |
| 18         | 59.3    | 30.4   | 21.5   | 0      | 14.5    | 4.6    | 61.8     | 685     | 438      | 221   | 111     | 97.1   |
| 19         | 59.0    | * 28.3 | 24.0   | 0      | * 7.4   | 2.8    | 142      | 558     | 530      | 201   | 109     | 97.1   |
| 20         | 62.5    | 30.4   | 20.5   | 0      | 8.1     | 2.1    | 136      | 558     | 551      | 181 * | 111     | 99.6   |
| 21         | 57.9    | 32.8   | 23.0   | 4.2    | 6.0     | 2.1    | 50.1     | 576 *   | 484      | 158   | 119     | 102    |
| 22         | 54.0    | 30.4   | 21.2   | 3.9    | 5.7     | 1.8    | 30.7     | 586     | 388 *    | 145   | 113     | 102 *  |
| 23         | 53.7    | 30.4   | 21.5   | 192    | 3.5     | 1.8    | * 20.5   | 509     | 364      | 138   | 113 *   | 100    |
| 24         | 53.3    | 30.4   | 24.0   | 139    | 3.2     | 1.8    | 10.9     | 448     | 340      | 131   | 112     | 98.5   |
| 25         | 56.5    | 30.4   | 19.1   | 25.1   | 2.8     | 10.9   | 6.4      | 396 *   | 293      | 120   | 106     | 94.3   |
| 26         | 59.7    | 30.4   | 19.4   | 24.0   | 2.1     | 13.8   | 6.0      | 367     | 285      | 115   | 106     | 94.3   |
| 27         | * 63.2  | 30.4   | 18.0   | 23.7   | 1.8     | 69.2   | 7.8      | 339     | 289      | 115   | 106     | 94.3   |
| 28         | 71.7    | 32.8   | 20.1   | 23.7   | 1.8     | 118    | 317      | 313     | 329      | 110 * | 99.2    | 94.3   |
| 29         | 77.0    | —      | 17.3   | 23.7   | 1.1     | 53.3   | 185      | 289     | 309      | 110   | 99.2    | 94.3   |
| 30         | 77.3    | —      | 17.7   | 23.7   | 35.7    | 81.2   | 26.5     | 266     | 227      | 110   | 93.2    | 96.8   |
| 31         | 77.7    | —      | 18.0   | 65.0   | 194     | 165    | 194      | 114     | 114      | 99.2  | 99.2    | 99.2   |
| <b>Sum</b> | 1,090.7 |        | 559.1  |        | 1,263.7 |        | 15,663.1 |         | 8,449    |       | 3,108.3 |        |
|            | 2,094.0 |        | 805.3  |        | 849.2   |        | 2,206.2  |         | 10,853.0 |       | 3,217.2 |        |

Current Year: 1981

| Month  | Extreme Gage Feet |      |     | Extreme Second-Feet            |       | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |         |         |         |
|--------|-------------------|------|-----|--------------------------------|-------|---------------------|----------------------------------|-----------|---------|---------|---------|
|        | High              |      | Low | Day                            | High  |                     |                                  | Average   | Maximum | Minimum |         |
|        | High              | Low  |     | Day                            | High  | Low                 |                                  | High      | Maximum | Minimum |         |
| Jan.   | 3.51              | 3.25 | ! 1 |                                | 84.8  | 17                  | 49.8                             | 67.5      | 4,153   | 3,390   | 7,415   |
| Feb.   | 3.51              | 2.99 | 1   |                                | 78.0  | 111                 | 27.5                             | 38.8      | 2,163   | 1,853   | 3,396   |
| Mar.   | 3.48              | 2.66 | 1   |                                | 76.3  | 31                  | 13.1                             | 26.1      | 1,598   | 1,054   | 1,598   |
| Apr.   | 6.04              | 2.23 | 23  |                                | 1,150 | 15                  | 0                                | 18.7      | 1,108   | 756     | 2,505   |
| May    | 4.36              | 1.64 | 6   |                                | 262   | 29                  | 1.1                              | 27.5      | 1,684   | 1,735   | 5,031   |
| June   | 4.76              | 2.26 | 5   |                                | 396   | 124                 | 1.4                              | 42.0      | 2,507   | 2,890   | 7,756   |
| July   | 5.45              | 2.76 | 28  |                                | 738   | 2                   | 3.5                              | 71.3      | 4,378   | 2,955   | 9,420   |
| Aug.   | 10.40             | 3.31 | 15  |                                | 3,880 | 4                   | 43.8                             | 505       | 31,066  | 8,388   | 31,066  |
| Sept.  | 5.51              | 3.61 | 7   |                                | 692   | 4                   | 56.9                             | 360       | 21,526  | 29,267  | 135,232 |
| Oct.   | 7.25              | 3.58 | 5   |                                | 1,560 | 25                  | 82.6                             | 273       | 16,759  | 15,706  | 435     |
| Nov.   | 3.87              | 3.61 | 120 |                                | 119   | 7                   | 83.0                             | 107       | 6,379   | 5,338   | 10,241  |
| Dec.   | 3.84              | 3.71 | ! 7 |                                | 115   | 124                 | 89.0                             | 100       | 6,168   | 4,947   | 11,506  |
|        | 10.40             |      |     |                                | 3,880 |                     | 0                                | 137       | 99,489  | 78,279  | 214,936 |
| Yearly | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |       |                     | <b>Thousands of Cubic Meters</b> |           |         |         |         |
|        | 3.17              |      |     |                                | 110   |                     | 0                                | 3.89      | 122,719 | 96,555  | 265,124 |
|        |                   |      |     |                                |       |                     |                                  |           |         |         | 18,685  |

\* Discharge measurement made on this day      ! And other days      # Estimated

**RIO GRANDE ABOVE RIO CONCHOS NEAR PRESIDIO, TEXAS  
AND OJINAGA, CHIHUAHUA**

**DESCRIPTION:** Cableway, bubbler gage, and digital water-stage recorder located on the left bank at latitude 29°36'15", longitude 104°27'05", and river mile 963.7 (1,551.0 km); 5.0 river miles (8.0 km) upstream from the international highway bridge between Presidio, Texas and Ojinaga, Chihuahua and 2.4 river miles (3.8 km) upstream from the Rio Conchos. The zero of the gage is 2,573.14 feet (784.29 m) above mean sea level, U.S.C. & G.S. datum.

**RECORDS:** Based on 65 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1889 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Prior to 1978 the zero of the gage was 2,576.66 feet (785.37 m) above mean sea level, U.S.C. & G.S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 14,000 second-feet (396 m<sup>3</sup>/sec) on June 14, 1905. Highest flow recorded since 1924 was 5,160 second-feet (146 m<sup>3</sup>/sec), with a gage height of 10.57 feet (3.22 m), on May 26, 1924. Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                   |                    |                 |            |
|----------|-------------------|--------------------|-----------------|------------|
| Daily:   | Max. 13,700 (388) | June 13 & 14, 1905 | Min. 0          | Frequently |
| Monthly: | Max. 10,150 (287) | June 1905          | Min. 0          | Frequently |
| Yearly:  | Max. 1,970 (55.8) | 1907               | Min. 1.3 (0.04) | 1964       |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.   | Feb.    | March  | April   | May    | June   | July   | Aug.    | Sept.   | Oct.   | Nov.   | Dec.    |
|------------|--------|---------|--------|---------|--------|--------|--------|---------|---------|--------|--------|---------|
| 1          | 64.6   | 53.7    | 32.1   | 22.6    | 45.6   | 10.9   | 10.9   | 47.0    | 271     | 285 *  | 129    | 87.9    |
| 2          | 65.3   | 51.9    | 35.7   | 17.7    | 70.6   | 10.9   | 14.1   | 66.7    | 252     | 296    | 125 *  | 85.1    |
| 3          | 62.2   | * 56.5  | * 39.2 | 16.2    | 115    | 12.4   | 23.7   | 71.7    | 227     | 287    | 125    | 85.8    |
| 4          | 66.0   | 58.6    | 29.3   | 13.4    | * 35.0 | 13.8   | 17.3   | * 67.1  | 258     | 448    | 121    | 87.2    |
| 5          | 66.4   | 55.1    | 32.1   | 17.0    | 19.8   | 50.1   | 35.0   | 71.3    | 629     | 780    | 116    | 85.1    |
| 6          | * 66.7 | 59.3    | 29.3   | * 14.8  | 15.9   | 35.0   | 30.4   | 89.7    | 420     | 696 *  | 114    | 88.3    |
| 7          | 65.7   | 60.0    | 32.1   | 14.8    | 14.1   | 18.4   | * 21.2 | 75.9    | 252     | 657    | 113    | * 92.2  |
| 8          | 68.5   | 56.9    | 35.0   | 17.7    | 20.5 * | * 19.8 | 13.8   | 75.6    | 618     | 816    | 111    | 92.5    |
| 9          | 67.5   | * 45.9  | * 35.0 | 13.4    | 30.7   | 39.2   | 10.6   | 84.4    | 1,390 * | 929    | 99.9   | 90.1    |
| 10         | 66.4   | 53.3    | 29.3   | 15.2    | 30.0   | 55.8   | 13.8   | 84.4    | 4,660 * | 848    | * 98.2 | 94.3    |
| 11         | * 57.9 | 47.0    | 29.7   | 25.4    | * 27.5 | 53.0   | 22.6   | * 80.5  | 3,100 * | 713    | 97.1   | 98.5    |
| 12         | * 56.9 | 50.1    | 32.8   | 29.0    | 35.3   | 35.0   | 23.7   | 102     | 1,700 * | 597    | 103    | 97.8    |
| 13         | 54.0   | 68.2    | 36.4   | * 27.9  | 26.5   | 16.2   | 25.4   | 157     | 1,090 * | 583 *  | 105    | 99.6    |
| 14         | 54.7   | 72.0    | 36.7   | 480     | 21.5   | 12.0 * | * 21.2 | 198     | 855     | 554    | 112    | 101 *   |
| 15         | 62.5   | 72.0    | 37.1   | 646 *   | 21.2   | * 33.9 | 15.5   | 250     | 600 *   | 473    | 114    | 96.1    |
| 16         | 63.2   | 72.0    | * 31.4 | 108 *   | 20.5   | 9.5    | 17.0   | 272     | 498     | 427    | 116    | 96.1    |
| 17         | 60.7   | 60.4    | 18.7   | 48.4    | 27.5   | 11.3   | 54.7   | 353     | 456     | 371    | 118 *  | 95.7    |
| 18         | 54.7   | * 53.3  | 18.0   | 38.5 *  | * 23.0 | 10.6   | 45.2   | 547 *   | 438 *   | 334    | 118    | 94.3    |
| 19         | 55.4   | * 27.5  | 15.2   | 33.5    | 20.8   | 9.5    | 40.6   | 770     | 413     | 300    | 119    | 94.3    |
| 20         | * 49.1 | 30.7    | 14.5 * | 30.0    | 17.7   | 9.5    | 25.4   | 975 *   | 392     | 288 *  | 115    | 94.6    |
| 21         | 47.3   | 25.4    | 13.4   | 24.0    | 18.4   | * 9.5  | * 22.2 | 943 *   | 385 *   | 267    | 114    | * 93.2  |
| 22         | 42.0   | 31.1    | 12.7   | 40.6    | 17.3   | * 9.5  | 24.0   | 675     | 403     | 239    | 118    | 92.5    |
| 23         | 44.5   | * 28.6  | * 17.7 | 28.6    | 15.9   | 10.6   | 26.5   | 459     | 424     | 217    | 121    | 89.7    |
| 24         | 49.8   | 23.3    | 21.9   | * 97.8  | 17.0   | 7.1    | 21.5   | 378     | 438     | 200    | 124 *  | 86.2    |
| 25         | 48.0   | 26.1    | 21.9   | 65.7    | 17.3   | 6.7    | 22.6   | 353 *   | 434     | 183    | 129    | 85.5    |
| 26         | * 43.4 | 23.7    | 17.0   | 82.6    | * 16.6 | 9.5    | 32.1   | 360     | 399     | 165 *  | 131    | 87.6    |
| 27         | 42.0   | 26.1    | 12.4   | 112     | 15.2   | 14.5   | 25.8   | 367     | 353     | 157    | 124    | 91.1    |
| 28         | 36.7   | 29.3    | 12.0   | 103 *   | 12.7   | 41.3   | * 47.7 | 357     | 326     | 150    | 117    | * 92.2  |
| 29         | 31.8   |         | 11.7   | 81.6    | 9.2    | 23.7   | 78.8   | 317     | 300 *   | 144    | 107    | 93.6    |
| 30         | 38.5   |         | 23.3   | 61.4    | 10.6 * | 16.2   | 41.0   | 308     | 284     | 142    | * 95.0 | 92.9    |
| 31         | 54.0   |         | * 32.5 |         | 11.3   |        | 36.0   | 292 *   |         | 137    |        | 92.2    |
| <b>Sum</b> |        | 1,318.0 |        | 2,326.8 |        | 615.4  |        | 9,247.3 |         | 12,683 |        | 2,853.2 |
|            |        | 1,706.4 |        | 796.1   |        | 800.2  |        | 860.3   |         | 22,265 |        | 3,449.2 |

**Current Year 1981**

**Period 1938-1981**

| Month         | Extreme Gage Feet |      | Extreme Second-Feet            |       | Average Second-Feet | Total Acre-Feet | Acre-Feet                        |         |         |
|---------------|-------------------|------|--------------------------------|-------|---------------------|-----------------|----------------------------------|---------|---------|
|               | High              | Low  | Day                            | Day   |                     |                 | Average                          | Maximum | Minimum |
| Jan.          | 2.30              | 2.00 | 9                              | 71.3  | 128                 | 31.8            | 55.1                             | 3,386   | 24,400  |
| Feb.          | 2.53              | 1.80 | 112                            | 98.5  | 123                 | 21.2            | 47.0                             | 2,615   | 40,800  |
| Mar.          | 2.20              | 1.67 | 7                              | 59.0  | 29                  | 11.7            | 25.8                             | 1,578   | 2,989   |
| Apr.          | 6.92              | 1.31 | 14                             | 1,260 | 22                  | 3.5             | 77.7                             | 4,616   | 41,600  |
| May           | 3.61              | 1.57 | 2                              | 272   | 2                   | 8.1             | 25.8                             | 1,588   | 7,563   |
| June          | 4.40              |      | 15                             | 406   | 25                  | 6.7             | 20.5                             | 1,221   | 8,117   |
| July          | 3.18              | 1.31 | 28                             | 214   | 1                   | 2.8             | 27.9                             | 1,707   | 10,728  |
| Aug.          | 6.00              | 2.00 | 20                             | 1,120 | 11                  | 41.3            | 298                              | 18,342  | 133,000 |
| Sept.         | 11.25             | 2.99 | 10                             | 4,890 | 4                   | 177             | 742                              | 44,184  | 151,000 |
| Oct.          | 5.68              | 2.69 | 9                              | 964   | 31                  | 132             | 410                              | 25,152  | 14,424  |
| Nov.          | 2.72              | 2.53 | 125                            | 133   | 30                  | 90.4            | 115                              | 6,842   | 5,616   |
| Dec.          | 2.53              | 2.30 | 13                             | 107   | 24                  | 77.7            | 92.2                             | 5,660   | 34,500  |
|               | 11.25             | 1.31 |                                | 4,890 |                     | 2.8             | 161                              | 116,891 | 5,539   |
| <b>Yearly</b> | <b>Meters</b>     |      | <b>Cubic Meters per Second</b> |       |                     |                 | <b>Thousands of Cubic Meters</b> |         |         |
|               | 3.43              | 0.40 |                                | 138   |                     | 0.08            | 4,57                             | 144,183 | 115,812 |

\*\* Period June 1900-March 1914; September 1919-March 1920; and 1924-1981

! And other days

\* Discharge measurement made on this day

Ø Mean daily

## RIO CONCHOS NEAR OJINAGA, CHIHUAHUA

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the right bank at latitude 29°34'55", longitude 104°25'50", 0.6 river miles (1.0 km) from the confluence with the Rio Grande, 2.5 miles (4 km) northwest of Ojinaga, Chihuahua, and 3.7 miles (6 km) northwest of Presidio, Texas. This stream enters the Rio Grande at river mile 961.4 (1,547.2 km), 11.6 river miles (18.7 km) upstream from the "Rio Grande below & G. S. datum.

**RECORDS:** Based on 123 discharge measurements during the year, 122 by the Mexican Section and 1 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: 1896 through 1981. Prior to April 4, 1954, flow records were determined from records of the Rio Grande at stations located upstream and downstream from the Rio Conchos confluence.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. La Boquilla Reservoir, La Colina Reservoir, La Rosettilla Reservoir, and Luis L. Leon Reservoir are located 252 (405), 244 (393), 188 (302), and 114 (183) river miles (km), respectively, upstream from this station. Francisco I. Madero Reservoir is located on the Rio San Pedro, a tributary which enters the Rio Conchos 176 river miles (283 km) upstream from this station. Power generation facilities: La Boquilla 14,647 kw., La Colina 3,620 kw., La Rosettilla 5,150 kw., Francisco I. Madero and Luis L. Leon, none. The station was relocated on January 20, 1978 due to the Rio Grande channel rectification in the Presidio-Ojinaga area.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 162,000 second-feet (4,590 m<sup>3</sup>/sec.), on September 11, 1904.

|  | Daily: Max. 52,600 (41,490) | Oct. 1, 1978 | Min. 23.0 (0.65) | Dec. 19, 1973 |
|--|-----------------------------|--------------|------------------|---------------|
|  | Monthly: Max. 10,700 (302)  | Oct. 1978    | Min. 57.9 (1.64) | Feb. 1968     |
|  | Yearly: Max. 2,340 (66.4)   | 1978         | Min. 639 (18.1)  | 1971          |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.          | Feb.          | March         | April | May   | June          | July          | Aug.  | Sept.          | Oct.          | Nov.    | Dec.    |
|------------|---------------|---------------|---------------|-------|-------|---------------|---------------|-------|----------------|---------------|---------|---------|
| 1          | 805           | 735           | 1,380         | 1,440 | 752   | 816           | 1,190         | 773   | 1,090          | 1,030         | 1,830   | 459     |
| 2          | 897           | 791           | 1,380         | 1,430 | 1,220 | 904           | 1,060         | 784   | 932            | 961           | 1,830   | 466     |
| 3          | 911 *         | 1,290         | 1,380         | 1,420 | 3,430 | 614           | 1,090         | 780   | 816            | 830           | 1,840 * | 516     |
| 4          | 918           | 1,370         | 1,370         | 1,450 | 1,170 | 604           | 1,060         | 738   | 1,330          | 833           | 1,840 * | 509 *   |
| 5          | 932 *         | 1,390         | 1,380         | 1,530 | 876   | 1,590         | 978           | 752   | 2,120          | 2,450 *       | 1,890   | 579     |
| 6          | 936           | 1,410         | 1,510         | 1,540 | 1,140 | 1,410         | 978           | 992   | 1,250          | 2,170         | 1,830 * | 1,140   |
| 7          | 939           | 1,410         | 1,520         | 1,510 | 1,120 | 1,590         | 911           | 1,500 | 1,240          | 1,250         | 1,820   | 1,450   |
| 8          | 985 *         | 1,430         | 1,520         | 1,490 | 643   | 1,640         | 848           | 985   | 6,430          | 2,390         | 1,800   | 1,370 * |
| 9          | 961           | 1,440 *       | 1,510         | 1,500 | 671   | 1,620         | 840           | 1,390 | 10,800         | 3,190         | 1,830   | 1,350   |
| 10         | 957           | 1,420         | 1,510         | 1,480 | 759   | 1,590         | 862           | 1,210 | 5,260          | 2,500         | 1,866   | 1,370 * |
| 11         | 943           | 1,400         | 1,530         | 1,470 | 713   | 1,540         | 922           | 1,050 | 4,270          | 3,430         | 1,830   | 1,390   |
| 12         | 950           | 1,410         | 1,530         | 1,550 | 696   | 1,490         | 766           | 1,790 | 4,340          | 3,780         | 1,810   | 1,460   |
| 13         | 957 *         | 1,400         | 1,540         | 1,560 | 664   | 1,430         | 720           | 3,140 | 5,970          | 4,030         | 1,770   | 1,450   |
| 14         | 946           | 1,390         | 1,520         | 4,170 | 625   | 1,380         | 710           | 2,870 | 6,180          | 5,370         | 1,730   | 1,440 * |
| 15         | 943 *         | 1,400         | 1,510         | 2,280 | 597   | 1,400         | 671           | 3,140 | 6,290          | 5,790         | 1,690   | 1,430   |
| 16         | 943           | 1,450 *       | 1,500         | 1,180 | 569   | 1,350         | 685           | 2,880 | 6,890          | 5,760         | 1,310   | 1,370   |
| 17         | 950           | 1,390         | 1,480         | 1,270 | 533   | 1,270         | 780           | 2,650 | 5,960          | 5,860         | 1,120   | 795 *   |
| 18         | 957           | 1,360         | 1,480         | 1,090 | 562   | 1,380         | 802           | 1,770 | 6,250          | 4,590         | 1,040   | 1,370   |
| 19         | 961 *         | 1,320         | 1,530         | 982   | 558   | 1,360         | 703           | 2,090 | 6,180          | 3,170         | 840     | 1,490   |
| 20         | 939           | 1,320         | 1,540         | 795   | 540   | 1,310         | 675           | 2,100 | 6,070          | 3,030         | 622     | 1,520   |
| 21         | 862           | 1,340         | 1,540         | 742   | 544   | 1,230         | 597           | 2,070 | 5,970          | 2,960         | 600     | 1,520 * |
| 22         | 611 *         | 1,330         | 1,510         | 1,070 | 544   | 915           | 576           | 2,700 | 5,860          | 2,910         | 590     | 1,520   |
| 23         | 413           | 1,320         | 1,530         | 1,150 | 544   | 812           | 533           | 2,750 | 6,040          | 2,860         | 583     | 1,500   |
| 24         | 413           | 1,320         | 1,540         | 1,650 | 551   | 727           | 600           | 2,640 | 7,170          | 2,600         | 576     | 1,460 * |
| 25         | 413           | 1,310         | 1,510         | 939   | 565   | 654           | 667           | 2,540 | 6,670          | 1,940         | 565     | 833     |
| <b>Sum</b> | <b>37,106</b> | <b>40,633</b> | <b>35,396</b> |       |       | <b>56,764</b> | <b>86,644</b> |       |                | <b>33,257</b> |         |         |
|            | <b>24,697</b> | <b>46,260</b> | <b>24,034</b> |       |       | <b>25,030</b> |               |       | <b>139,678</b> | <b>37,776</b> |         |         |

| Month         | Current Year 1981 |      |                                |        |                                  |                 | Period 1968-1981                 |           |           |
|---------------|-------------------|------|--------------------------------|--------|----------------------------------|-----------------|----------------------------------|-----------|-----------|
|               | Extreme Gage Feet |      | Extreme Second-Feet            |        | Average Second-Feet              | Total Acre-Feet | Acre-Feet                        |           |           |
|               | High              | Low  | Day                            | Day    |                                  |                 | Average                          | Maximum   | Minimum   |
| Jan.          | 3.77              | 2.82 | 8                              | 1,110  | 123                              | 413             | 798                              | 48,990    | 38,939    |
| Feb.          | 4.49              | 3.28 | 19                             | 1,840  | 1                                | 724             | 1,320                            | 73,632    | 35,769    |
| Mar.          | 4.33              | 3.94 | 21                             | 1,570  | 14                               | 1,340           | 1,490                            | 91,773    | 55,209    |
| Apr.          | 11.38             | 3.64 | 14                             | 11,700 | 121                              | 724             | 1,360                            | 80,622    | 47,199    |
| May           | 6.46              | 3.31 | 4                              | 3,570  | 9                                | 399             | 777                              | 47,673    | 49,210    |
| June          | 6.27              | 3.44 | 27                             | 3,330  | 1                                | 572             | 1,180                            | 70,178    | 49,307    |
| July          | 4.46              | 3.35 | 29                             | 1,430  | 23                               | 509             | 809                              | 49,655    | 63,785    |
| Aug.          | 7.68              | 3.64 | 13                             | 6,070  | 1                                | 727             | 1,830                            | 112,591   | 154,562   |
| Sept.         | 14.24             | 3.71 | 9                              | 14,500 | 4                                | 742             | 4,660                            | 277,022   | 102,211   |
| Oct.          | 8.53              | 3.77 | 17                             | 5,930  | 3                                | 812             | 2,790                            | 175,789   | 243,660   |
| Nov.          | 5.12              | 3.38 | 5                              | 1,900  | 28                               | 501             | 1,260                            | 71,956    | 468,680   |
| Dec.          | 4.92              | 3.28 | 12                             | 1,660  | 1                                | 459             | 1,070                            | 65,969    | 137,415   |
|               | 14.24             | 2.82 |                                | 14,500 |                                  | 399             | 1,610                            | 822,385   | 1,698,395 |
| <b>Yearly</b> | <b>Meters</b>     |      | <b>Cubic Meters per Second</b> |        | <b>Thousands of Cubic Meters</b> |                 | <b>Thousands of Cubic Meters</b> |           |           |
|               | 4.34              | 0.86 |                                | 410    |                                  | 11.3            | 45.6                             | 1,436,909 | 1,014,401 |
|               |                   |      |                                |        |                                  |                 |                                  | 2,094,945 | 572,051   |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

## Estimated

## ALAMITO CREEK NEAR PRESIDIO, TEXAS

**DESCRIPTION:** Gravity well and water-stage recorder located on the left bank 300 feet (91.4 m) upstream from the highway bridge on Farm-to-Market Road 170 at latitude 29°31'25", longitude 104°17'15", about 2,000 feet (610 m) from the confluence with the Rio Grande, and about 6 miles (9.7 km) southeast of Presidio, Texas. This stream enters the Rio Grande near the lower end of the Presidio Valley at river mile 950.1 (1,529.1 km), 8.6 river miles (13.8 km) downstream from the international highway bridge between Presidio, Texas and Ojinaga, Chihuahua. Measurements of high flows are made from the highway bridge. The zero of the gage is 2,541.61 feet (774.68 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 58 discharge measurements during the year at low and medium flows, a high flow rating curve determined by slope-area calculations, and a continuous record of gage heights. Computations by shifting control methods. Records available: 1932 through 1981.

**REMARKS:** A small irrigation reservoir (San Esteban) 10.5 miles (16.9 km) south of Marfa, Texas and irrigation diversions below the reservoir modify the flow of this spring-fed creek. Backwater from the Rio Grande begins to affect the station record when the flow at the station on the Rio Grande below Rio Conchos reaches about 35,000 second-feet (991 m³/sec).

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 56,400 second-feet (1,600 m³/sec), determined by slope-area calculations, on September 2, 1962, with a gage height of 13.54 feet (4.13 m). Min. 0.01 second-foot (0.003 m³/sec) occasionally.

## Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |                |                  |              |
|----------|-------------------|----------------|------------------|--------------|
| Daily:   | Max. 12,400 (351) | Sept. 21, 1974 | Min. 0.1 (0.003) | Occasionally |
| Monthly: | Max. 998 (28.3)   | Sept. 1974     | Min. 0.2 (0.005) | July 1980    |
| Yearly:  | Max. 97.1 (2.75)  | 1974           | Min. 4.3 (0.12)  | 1951         |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.        | March | April          | May   | June  | July         | Aug.  | Sept.        | Oct.  | Nov.           | Dec.  |             |  |
|------------|-------|-------------|-------|----------------|-------|-------|--------------|-------|--------------|-------|----------------|-------|-------------|--|
| 1          | 1.4   | 1.8         | 1.8   | 1.1 *          | 1.8 * | 1.1 * | 1.4          | 1.8   | 1.4          | 17.7  | 2.1            | 2.1   |             |  |
| 2          | 1.4   | 1.8         | 1.8   | 1.1            | 2.1   | 1.1   | 1.4          | 1.8 * | 1.4 *        | 38.5  | 2.1            | 2.1   |             |  |
| 3          | 1.4 * | 1.8 *       | 1.8   | 1.1            | 10.6  | 1.1   | 3.5          | 1.1   | 1.4          | 3.5   | 1.8            | 2.1   |             |  |
| 4          | 1.4   | 1.8         | 1.8   | 1.4 *          | 1.8   | 1.1   | 1.4 *        | 1.1   | 1.4          | 11.7  | 1.8            | 2.1   |             |  |
| 5          | 1.4   | 1.8         | 1.8   | 1.4            | 2.8   | 1.1   | 105          | 1.1   | 117          | 632 * | 1.8            | 2.1   |             |  |
| 6          | *     | 1.4         | 1.8   | 1.8 *          | 1.4   | 34.3  | 41.3         | 26.8  | 1.8          | 15.5  | 371 *          | 1.4 * | 2.1         |  |
| 7          | 1.4   | 2.1         | 1.8   | 1.4            | 16.6  | 1.1   | *            | 1.4   | 1.8          | 3.9   | 7.8            | 1.4 * | 2.1         |  |
| 8          | 1.4   | 2.1         | 1.8   | 1.4            | 1.8 * | 1.7   | 1.4          | 1.8   | 79.8         | 270   | 1.4            | 2.1   |             |  |
| 9          | 1.4 * | 2.1 *       | 1.8   | 1.4            | 1.4   | .7    | 18.0         | 1.8 * | 3.9          | 31.4  | 1.1            | 2.1   |             |  |
| 10         | 1.1   | 2.1         | 1.8   | 1.4            | 1.4   | .7    | 134          | 1.1   | 1.4          | 4.6   | *              | 1.1   | 2.1         |  |
| 11         | 1.1   | 2.1         | 1.8   | 1.4 *          | 1.4   | .7    | 37.1         | *     | 1.8          | 1.4   | 22.2           | 1.1   | 2.5         |  |
| 12         | *     | 1.1         | 2.1   | 1.8            | 1.4   | 1.4   | 2.8          | 81.6  | 1.4          | 3.9   | 1.1            | 2.5   |             |  |
| 13         | 1.1   | 2.1         | 1.8 * | 1.4            | 1.4   | .7    | 1.8          | 32.1  | 55.1         | 2.8   | 1.1            | 2.5   |             |  |
| 14         | 1.4   | 2.1         | 1.8   | 5.7            | 1.4   | .7    | *            | 1.4   | 84.8         | 1.1   | 1.4            | .7 *  | 2.5         |  |
| 15         | 1.4   | 2.1         | 1.8 * | 42.0           | 1.8 * | .7    | 1.4          | 53.7  | 1.4 *        | 1.4   | .7             | 2.5   |             |  |
| 16         | 1.4   | 2.1 *       | 1.8   | 8.5            | 1.8   | .7    | 1.4          | 1.4   | 1.4          | 183   | .7             | 2.5   |             |  |
| 17         | 1.4   | 2.1         | 1.8   | 8.5            | 1.8   | .7    | 1.1          | 228   | 1.4          | 15.2  | *              | 2.5   |             |  |
| 18         | 1.4 * | 2.1         | 1.8   | 8.5 *          | 1.8   | 1.1   | 1.1          | *     | 8.1          | 1.4   | 3.9            | .7    | 2.5         |  |
| 19         | 1.8   | 2.1         | 1.8   | 7.8            | 1.8   | 1.1   | 1.1          | 85.5  | 1.4          | 2.1   | 1.1            | 2.5   |             |  |
| 20         | *     | 1.8         | 2.1   | 7.8            | 7.8   | 1.4   | 1.1          | 30.0  | 1.4 *        | 2.1   | 1.1            | 2.5   |             |  |
| 21         | 1.8   | 1.8         | 1.8   | 7.8            | 1.4   | *     | 1.1          | *     | 2.1          | 1.4   | 2.1            | 1.1 * | 2.5         |  |
| 22         | 1.8   | 1.8         | 1.8   | 7.8            | 1.4   | *     | 1.1          | 1.1   | 1.4          | 21.9  | 1.1            | 2.5   |             |  |
| 23         | 1.8 * | 1.8 *       | 1.8   | 911            | 1.4   | 1.1   | 1.1          | 1.1   | 1.4          | 17.7  | 1.1            | 2.5   |             |  |
| 24         | 1.8   | 1.8         | 1.8   | 780 *          | 1.4   | 1.1   | 1.1          | 1.1   | 1.4          | 5.3   | *              | 1.1   | 2.5         |  |
| 25         | 1.8   | 1.8         | 1.4   | 23.0           | 1.1   | 1.1   | 1.1          | *     | 1.1          | 1.1   | 1.4            | 2.1   |             |  |
| 26         | *     | 1.8         | 1.8   | 1.4            | 12.7  | *     | 1.1          | 1.1   | 1.1          | 1.1   | *              | 2.1   | 2.1         |  |
| 27         | 1.8   | 1.8         | 1.4   | 6.7            | 1.1   | 1.1   | 1.1          | 1.1   | 1.4          | 21.1  | 2.1            | 1.8   | 2.1         |  |
| 28         | 1.8   | 1.8         | 1.4 * | 1.4            | 1.1   | 14.8  | *            | 8.5   | 1.1          | 1.4   | 2.1            | 1.8 * | 2.1         |  |
| 29         | 1.8   | 1.8         | 1.4   | 1.8            | 1.1   | .7    | 72.0         | 1.4 * | 1.1          | 2.1   | 2.1            | 2.1   |             |  |
| 30         | 1.8   | 1.8         | 1.4   | 1.4            | 1.1   | *     | 30.4         | 35.0  | 1.4          | 1.8   | 2.1            | *     | 2.1         |  |
| 31         | 1.8   | *           | 1.1   | 1.1            | 1.1   | 1.1   | 1.1          | 10.6  | *            | 1.4   | 2.1            | 2.1   | 2.5         |  |
| <b>Sum</b> |       | <b>54.6</b> |       | <b>1,859.7</b> |       |       | <b>111.8</b> |       | <b>636.2</b> |       | <b>1,688.3</b> |       | <b>71.5</b> |  |
|            | 47.4  |             | 52.7  |                | 103.9 |       | 478.0        |       | 327.7        |       | 40.0           |       |             |  |

## Current Year 1981

## Period 1932-1981

| Month  | Extreme Gage Feet |      |     | Extreme Second-Feet     |     | Average Second-Feet | Total Acre-Feet | Acre-Feet                 |         |          |  |  |
|--------|-------------------|------|-----|-------------------------|-----|---------------------|-----------------|---------------------------|---------|----------|--|--|
|        | High              |      | Low | High                    |     |                     |                 | Average                   | Maximum | Minimum  |  |  |
|        | High              | Low  |     | Day                     | Day |                     |                 |                           |         |          |  |  |
| Jan.   | 119               | 0    | 1.8 | 111                     | 0   | 1.1                 | 93.2            | 136                       | 273     | 46.4     |  |  |
| Feb.   | 17                | 0    | 2.1 | 11                      | 0   | 1.8                 | 108             | 186                       | 3,120   | 41.5     |  |  |
| Mar.   | 11                | 0    | 1.8 | 31                      | 0   | 1.1                 | 103             | 156                       | 1,018   | 46.4     |  |  |
| Apr.   | 9.45              | 5.31 | 23  | 8,330                   | 1   | 0                   | 62.2            | 3,690                     | 276     | 3,690    |  |  |
| May    | 5.94              |      | 5   | 124                     | 125 | 0                   | 1.1             | 205                       | 929     | 8,520    |  |  |
| June   | 6.14              | 5.09 | 16  | 293                     | 18  | .7                  | 15.5            | 221                       | 1,780   | 34.7     |  |  |
| July   | 6.86              | 5.18 | 5   | 964                     | 21  | .7                  | 3.5             | 948                       | 3,116   | 12,653   |  |  |
| Aug.   | 7.25              | 5.25 | 14  | 1,540                   | 13  | 1.1                 | 20.5            | 1,261                     | 3,153   | 24.2     |  |  |
| Sept.  | 6.89              | 5.45 | 8   | 1,010                   | 114 | 1.1                 | 10.9            | 651                       | 4,720   | 16,330   |  |  |
| Oct.   | 7.87              | 5.35 | 5   | 2,820                   | 8   | .4                  | 54.4            | 3,348                     | 1,807   | 56.9     |  |  |
| Nov.   |                   |      | 1   | 0                       | 2.1 | 114                 | 0               | .7                        | 200     | 2,554    |  |  |
| Dec.   |                   |      | 111 | 0                       | 2.5 | 1                   | 0               | 2.5                       | 145     | 408      |  |  |
|        | 9.45              |      |     | 8,330                   |     | 0.4                 | 15.0            | 10,848.7                  | 16,604  | 70,273.8 |  |  |
| Yearly | Meters            |      |     | Cubic Meters per Second |     |                     |                 | Thousands of Cubic Meters |         |          |  |  |
|        | 2.88              |      |     | 236                     |     | 0.01                | 0.42            | 13,379.8                  | 20,483  | 86,683   |  |  |
|        |                   |      |     |                         |     |                     |                 |                           |         | 3,835    |  |  |
|        | Mean daily        |      |     |                         |     |                     |                 | And other days            |         |          |  |  |

\* Discharge measurement made on this day      0 Mean daily      ! And other days

**RIO GRANDE BELOW RIO CONCHOS NEAR PRESIDIO, TEXAS  
AND OJINAGA, CHIHUAHUA**

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, water-stage recorders (graphic and digital), and binary decimal transmitter located on the left bank at latitude 29°31'10", longitude 104°47'10", and river mile 949.8 (1,525.8 km); 0.4 river mile (0.6 km) downstream from Alamito Creek and 9.0 river miles (14.4 km) downstream from the international highway bridge between Presidio, Texas and Ojinaga, Chihuahua. The zero of the gage is 2,532.00 feet (771.75 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on 59 discharge measurements during the year and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: 1955 through 1981. Records are also available from 1896 through June 13, 1932 for a station located about 12.1 river miles (19.5 km) downstream from the Rio Conchos and 1.3 miles (2.1 km) upstream from Alamito Creek; and from June 14, 1932 through 1954 for a station about 2.0 river miles (3.2 km) downstream from the Rio Conchos and 11.4 river miles (18.3 km) upstream from Alamito Creek.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The transmitter, operated in cooperation with the National Weather Service, relays gage height data upon interrogation by telephone via commercial circuits. Prior to December 1, 1979 the zero of the gage was 2,536.00 feet (772.97 m) above mean sea level, U. S. C. & G. S. datum.

EXTREME FLOWS FROM RECORDS: Momentary: Max. 61,200 second-feet ( $1,730 \text{ m}^3/\text{sec}$ ) on September 30, 1978 with a gage height of 15.41 feet (4.70 m). The greatest recorded flow occurred September 11, 1904, with a peak flow estimated at 162,000 second-feet ( $4,590 \text{ m}^3/\text{sec}$ ) at a station 11.8 miles (19.0 km) upstream. Min. 0.2 second-foot ( $0.01 \text{ m}^3/\text{sec}$ ) several days in July 1955, and on June 30, 1958.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*\*

|          | Average Tick in Seconds-Rect (Cubic Meter) |              |                  |                |
|----------|--|--------------|------------------|----------------|
| Daily:   | Max. 53,300 (1,510)                        | Oct. 1, 1978 | Min. 12.9 (0.37) | March 27, 1968 |
| Monthly: | Max. 11,500 (326)                          | Oct. 1978    | Min. 74.5 (2.11) | March 1968     |
| Yearly:  | Max. 2,390 (67.7)                          | 1978         | Min. 667 (18.9)  | 1977           |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Current Year 1981 |                   |      |                         |        |     |                           |                 |           | Period 1968-1981 |           |         |
|-------------------|-------------------|------|-------------------------|--------|-----|---------------------------|-----------------|-----------|------------------|-----------|---------|
| Month             | Extreme Gage Feet |      | Extreme Second-Feet     |        |     | Average Second-Feet       | Total Acre-Feet | Acre-Feet |                  |           |         |
|                   |                   |      | High                    |        | Low |                           |                 | Average   | Maximum          | Minimum   |         |
|                   | High              | Low  | Day                     | Day    |     |                           |                 |           |                  |           |         |
| Jan.              | 4.27              | 2.46 | 8                       | 1,110  | 29  | 249                       | 840             | 51,606    | 38,908           | 116,947   | 16,068  |
| Feb.              | 4.86              | 3.67 | 19                      | 1,620  | 1   | 798                       | 1,370           | 76,371    | 35,059           | 110,937   | 4,745   |
| Mar.              | 5.51              | 4.59 | 11                      | 1,760  | 2   | 1,260                     | 1,490           | 91,619    | 54,714           | 223,755   | 4,583   |
| Apr.              | 9.15              | 3.77 | 23                      | 11,900 | 21  | 812                       | 1,610           | 96,089    | 47,580           | 96,089    | 6,497   |
| May               | 6.99              | 3.08 | 3                       | 5,830  | 9   | 516                       | 830             | 51,084    | 49,313           | 124,046   | 12,147  |
| June              | 6.20              | 3.28 | 6                       | 4,840  | 13  | 611                       | 1,230           | 73,324    | 49,190           | 146,055   | 5,927   |
| July              | 5.05              | 3.22 | 5                       | 1,670  | 24  | 565                       | 879             | 53,970    | 68,207           | 172,324   | 18,744  |
| Aug.              | 7.15              | 3.71 | 17                      | 6,220  | 1   | 788                       | 2,300           | 141,085   | 110,827          | 270,367   | 30,365  |
| Sept.             | 9.88              | 4.20 | 9                       | 17,600 | 4   | 996                       | 5,900           | 351,144   | 193,387          | 469,832   | 22,409  |
| Oct.              | 8.14              | 4.53 | 14                      | 9,010  | 3   | 1,210                     | 3,600           | 220,516   | 145,323          | 706,691   | 16,772  |
| Nov.              | 5.38              | 3.15 | 8                       | 2,060  | 28  | 600                       | 1,370           | 81,799    | 50,758           | 128,549   | 8,741   |
| Dec.              | 5.28              | 2.99 | 20                      | 1,880  | 5   | 473                       | 1,250           | 77,106    | 34,395           | 77,106    | 15,554  |
|                   | 9.88              | 2.46 |                         | 17,600 |     | 249                       | 1,890           | 1,365,713 | 877,661          | 1,732,514 | 483,092 |
| Yearly            | Meters            |      | Cubic Meters per Second |        |     | Thousands of Cubic Meters |                 |           |                  |           |         |
|                   | 3.01              | 0.75 |                         | 498    |     | 7.04                      | 53.4            | 1,684,589 | 1,082,594        | 2,137,056 | 595,894 |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

## TERLINGUA CREEK NEAR TERLINGUA, TEXAS

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank at latitude  $29^{\circ}11'50''$ , longitude  $103^{\circ}36'20''$ , 2.6 creek miles (4.2 km) from the confluence with the Rio Grande, and about 8.5 miles (13.7 km) south of Terlingua, Brewster County, Texas. This creek enters the Rio Grande at river mile 885.2 (1,424.6 km), the lower end of Santa Helena Canyon. The zero of the gage is 2,200.64 feet (670.76 m) above mean sea level, U. S. G. & G. S. datum.

**RECORDS:** Based on 42 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1932 through 1981.

**REMARKS:** Irrigation diversions modify the flow of this spring-fed creek at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 34,900 second-feet (988  $\text{m}^3/\text{sec}$ ) on May 24, 1935 with a gage height of 17.59 feet (5.36 m) on a gage 0.3 mile (0.5 km) downstream. Min. 0.1 second-foot (0.003  $\text{m}^3/\text{sec}$ ) several days in June and July 1950.

| Average Flow in Second-Feet (Cubic Meters per Second) |      |        |        |              |  |  |                  |                      |              |  |  |
|---|------|--------|--------|--------------|--|--|------------------|----------------------|--------------|--|--|
| Daily:  | Max. | 17,200 | (487)  | June 1, 1937 |  |  | Min. 0.1 (0.003) | Several days in June |              |  |  |
| Monthly:  | Max. | 1,150  | (32.6) | Sept. 1974   |  |  | Min. 0.8 (0.02)  | & July 1950          | October 1934 |  |  |
| Yearly:   | Max. | 146    | (4.13) | 1937         |  |  | Min. 5.5 (0.16)  |                      | 1943         |  |  |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March | April   | May    | June    | July   | Aug.    | Sept. | Oct.     | Nov.  | Dec.    |     |
|------------|-------|-------|-------|---------|--------|---------|--------|---------|-------|----------|-------|---------|-----|
| 1          | 1.4   | 2.5   | 1.8   | * 1.8   | 2.8    | * 24.4  | 2.8    | 150     | * 1.8 | * 8.5    | 5.7   | * 2.8   |     |
| 2          | * 1.4 | * 2.5 | * 1.8 | 1.8     | 234    | 37.1    | 2.8    | 89.7    | 374   | 385      | * 3.9 | 2.8     |     |
| 3          | 1.4   | 2.5   | 1.8   | 1.8     | 1,680  | 15.9    | 2.1    | 31.3    | 36.0  | 120      | 3.5   | 2.8     |     |
| 4          | 1.4   | 2.5   | 1.8   | 1.8     | * 73.1 | 4.9     | 2.1    | 15.5    | 344   | 61.8     | 3.5   | 2.8     |     |
| 5          | 1.4   | 2.5   | 1.8   | 1.8     | 54.4   | 62.5    | 2.5    | 10.6    | 199   | 2,430 *  | 3.5   | 2.8     |     |
| 6          | 1.4   | 2.5   | 1.8   | * 1.8   | 170    | 78.8    | * 24.0 | 8.5     | 22.2  | 1,910    | 3.2   | 2.8     |     |
| 7          | 1.4   | 2.5   | 1.8   | * 1.8   | 102    | 9.9     | 8.8    | 44.1    | 5.7   | 111      | 3.2   | 2.8     |     |
| 8          | 1.4   | 2.5   | 1.8   | 1.8     | 24.7   | 2.8     | 4.6    | 42.0    | 8.5   | 611      | 2.8   | 2.5     |     |
| 9          | 1.4   | 2.5   | 1.8   | 1.8     | 6.4    | *       | 1.8    | 74.5    | 12.4  | * 3.9    | 869   | * 2.8 * |     |
| 10         | 1.4   | 2.1   | 1.8   | 1.8     | 3.2    | 1.8     | 207    | * 9.5   | 3.9   | 152      | 2.8   | 2.5     |     |
| 11         | 1.4   | 2.1   | 1.8   | 1.8     | 3.2    | 1.8     | 51.6   | 29.0    | 3.5   | 203      | 2.8   | 2.5     |     |
| 12         | 1.4   | 2.1   | 1.8   | 2.1     | 3.2    | 1.8     | 10.6   | 189     | 1,140 | 106      | 2.8   | 2.5     |     |
| 13         | 1.4   | 2.1   | 1.8   | 2.1     | 2.5    | 452     | * 5.7  | 121     | 1,020 | 148 *    | 2.8   | 2.5     |     |
| 14         | 1.4   | 2.1   | 1.8   | 2.1     | 2.5    | 230     | 3.9    | 49.4    | 140   | 69.9     | 2.5   | 2.5     |     |
| 15         | 1.4   | 2.1   | 1.8   | 2.1     | 2.5    | 184     | 3.9    | 173     | 65.0  | 1,360    | 2.5   | 2.5     |     |
| 16         | 1.8   | 2.1   | 1.8   | 2.1     | 2.5    | * 66.0  | 5.3    | 126     | 16.6  | 636      | * 2.5 | * 2.5   |     |
| 17         | 1.8   | * 2.1 | * 1.8 | 2.1     | 2.5    | 6.0     | 147    | 323 *   | 5.3   | 143      | 2.5   | 2.5     |     |
| 18         | 1.8   | 2.1   | 1.8   | 2.1     | 2.5    | 2.1     | 9.5    | 791     | 2.8   | 56.5     | 2.5   | 2.5     |     |
| 19         | * 1.8 | 2.1   | 1.8   | 2.1     | 2.5    | 2.1     | 3.2    | 118     | 2.8   | * 34.6   | 2.1   | 2.5     |     |
| 20         | 3.9   | 2.1   | 1.8   | * 2.1   | 3.2    | 2.8     | * 2.5  | 81.9    | 2.5   | 26.5     | 2.1   | 2.5     |     |
| 21         | 9.9   | 2.1   | 1.8   | 2.5     | 3.2    | 2.8     | 2.5    | 22.6    | 2.5   | 23.0     | 2.1   | 2.5     |     |
| 22         | 3.5   | 2.1   | 1.8   | 2.1     | 2.5    | * 2.8   | 2.1    | 9.9     | * 2.1 | 484      | 2.1   | 2.5     |     |
| 23         | 2.5   | 2.1   | 1.8   | 509     | 2.5    | 2.8     | 2.1    | 5.7     | 22.2  | * 1.8    | 2.5   | 2.5     |     |
| 24         | 2.1   | 1.8   | 1.8   | 8,120   | 2.5    | 2.8     | 2.1    | * 4.2   | 11.3  | 20.5     | 2.1   | 2.5     |     |
| 25         | 2.1   | 1.8   | 1.8   | 604     | 2.5    | 2.8     | 2.1    | 3.9     | 2.5   | 17.3     | 2.1   | 2.5     |     |
| 26         | 2.1   | 1.8   | 1.8   | * 95.7  | 2.8    | 4.9     | 1.8    | 3.9     | 1.8   | 15.9     | 2.1   | 2.8     |     |
| 27         | 2.1   | 1.8   | 1.8   | * 14.5  | 2.8    | 35.3    | * 54.4 | 3.5     | 13.8  | * 14.8   | 2.5   | 2.8     |     |
| 28         | 2.1   | 1.8   | 1.8   | 3.9     | 2.8    | 3.5     | 431    | 3.5     | * 2.5 | 13.1     | 2.5   | 2.8     |     |
| 29         | * 2.1 | 1.8   | 1.8   | 2.8     | 2.8    | 2.8     | 249 *  | 61.8    | 3.2   | 2.1      | 11.3  | 2.5     | 2.8 |
| 30         | 2.1   | 1.8   | 1.8   | 2.8     | 2.8    | 4.9     | 530    | 2.8     | 2.1   | 9.2      | 2.8   | 2.8     |     |
| 31         | 1.8   | 1.8   | 1.8   |         | 2.8    | 125     |        | 2.8     |       | 7.4      |       | 2.8     |     |
| <b>Sum</b> |       | 60.9  |       | 9,396.0 |        | 1,500.1 |        | 2,480.9 |       | 10,080.5 |       | 81.4    |     |
|            |       | 64.5  |       | 55.8    |        | 2,407.7 |        | 1,789.3 |       | 3,443.9  |       | 82.6    |     |

| Current Year 1981 |                   |      |     |                         |     |                     |                           |           |         | Period 1932-1981 |       |  |
|-------------------|-------------------|------|-----|-------------------------|-----|---------------------|---------------------------|-----------|---------|------------------|-------|--|
| Month             | Extreme Gage Feet |      |     | Extreme Second-Feet     |     | Average Second-Feet | Total Acre-Feet           | Acre-Feet |         |                  |       |  |
|                   | High              | Low  | Day | High                    | Low |                     |                           | Average   | Maximum | Minimum          |       |  |
| Jan.              | 1.77              |      | 20  | 18.4                    | 1 1 | 1.4                 | 2.1                       | 128       | 189     | 875              | 82.7  |  |
| Feb.              |                   | 1    | 0   | 2.5                     | 124 | 0 1                 | 2.1                       | 121       | 232     | 4,400            | 73.4  |  |
| Mar.              |                   | 1    | 0   | 1.8                     | 1 1 | 0 1                 | 1.8                       | 109       | 258     | 2,410            | 72.4  |  |
| Apr.              | 10.63             |      | 24  | 25,100                  | 1 1 | 1.8                 | 313                       | 18,640    | 1,260   | 18,640           | 55.1  |  |
| May               | 5.71              | 1.54 | 3   | 7,100                   | 113 | 2.5                 | 77.7                      | 4,769     | 3,555   | 26,000           | 81.3  |  |
| June              | 6.14              | 1.71 | 13  | 8,330                   | 1 9 | 0 1                 | 50.1                      | 2,975     | 6,373   | 54,800           | 59.5  |  |
| July              | 4.86              | 1.94 | 28  | 4,630                   | 126 | 1.8                 | 57.6                      | 3,548     | 8,281   | 28,700           | 113   |  |
| Aug.              | 4.95              | 2.00 | 18  | 4,940                   | 1 7 | 2.8                 | 80.2                      | 4,921     | 6,341   | 33,617           | 123   |  |
| Sept.             | 5.84              | 1.97 | 13  | 7,490                   | 1 1 | 1.8                 | 115                       | 6,833     | 9,090   | 68,375           | 123   |  |
| Oct.              | 9.15              | 1.97 | 15  | 17,300                  | 1   | 2.5                 | 325                       | 20,004    | 3,403   | 27,900           | 50.8  |  |
| Nov.              |                   |      | 1   | 0                       | 5.7 | 23                  | 0 1                       | 164       | 398     | 3,058            | 64.9  |  |
| Dec.              |                   |      | 1   | 0                       | 2.8 | 1 8                 | 0 2.5                     | 161       | 311     | 3,080            | 90.0  |  |
|                   | 10.63             |      |     | 25,100                  |     | 1.4                 | 86.2                      | 62,373    | 39,691  | 105,807          | 3,958 |  |
| Yearly            | Meters            |      |     | Cubic Meters per Second |     |                     | Thousands of Cubic Meters |           |         |                  |       |  |
|                   | 3.24              |      |     | 711                     |     | 0.04                | 2.44                      | 76,937    | 48,954  | 130,513          | 4,882 |  |

\* Discharge measurement made on this day      0 Mean daily      1 And other days

**RIO GRANDE AT JOHNSON RANCH NEAR CASTOLON, TEXAS  
AND SANTA ELENA, CHIHUAHUA**

**DESCRIPTION:** Cableway, gravity well, and digital water-stage recorder located on the left bank at latitude 29°02'05", longitude 103°23'25", and river mile 862.4 (1,388.0 km); 1.3 river miles (2.2 km) upstream from the old Johnson Ranch headquarters, 6.0 river miles (9.7 km) downstream from Smoky Creek, and 9.2 river miles (14.8 km) upstream from Chizos Crossing and the Chihuahua-Coahuila state line. The zero of the gage is 2,045.30 feet (623.41 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 44 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: April 1936 through 1981.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 71,900 second-feet (2,040 m<sup>3</sup>/sec), on September 30, 1978 with a gage height of 28.40 feet (8.66 m). A flow estimated at 97,000 second-feet (2,750 m<sup>3</sup>/sec) with a stage of 24.6 feet (7.50 m) occurred at this station site on October 3, 1932. Min. no flow several days in 1953, 1955, 1957, and 1958.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                     |              |                  |               |
|----------|---------------------|--------------|------------------|---------------|
| Daily:   | Max. 65,300 (1,850) | Oct. 1, 1978 | Min. 27.5 (0.78) | Sept. 9, 1968 |
| Monthly: | Max. 12,200 (345)   | Oct. 1978    | Min. 96.9 (2.74) | April 1976    |
| Yearly:  | Max. 2,490 (70.5)   | 1978         | Min. 692 (19.6)  | 1977          |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.    | March   | April   | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.    |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1          | 554     | 795     | 1,370   | 1,450 * | 1,430   | 904 *   | 1,060   | 1,230   | 1,670 * | 2,070   | 2,020   | 667 *   |
| 2          | 569     | 826 *   | 1,370 * | 1,420   | 1,450   | 1,040   | 1,090   | 1,240   | 1,830   | 2,450   | 2,000 * | 667     |
| 3          | 858     | 851     | 1,390   | 1,360   | 2,900   | 953     | 1,200   | 893 *   | 1,390   | 2,020   | 2,030   | 667     |
| 4          | 957     | 1,120   | 1,380   | 1,320   | 3,440 * | 569     | 1,200   | 957     | 1,110   | 1,730   | 2,030   | 670     |
| 5          | 978 *   | 1,380   | 1,330   | 1,320   | 1,870   | 643     | 1,210   | 812     | 2,030   | 4,480   | 2,040   | 670     |
| 6          | 999     | 1,450   | 1,330   | 1,440   | 2,010   | 1,600   | 1,230 * | 766     | 2,750   | 9,750   | 2,030   | 750     |
| 7          | 1,020   | 1,450   | 1,480   | 1,470 * | 1,180   | 1,440   | 1,180   | 1,250   | 1,720   | 4,870   | 2,020   | 1,200   |
| 8          | 1,020   | 1,470   | 1,520   | 1,500   | 1,720   | 1,290   | 1,090   | 1,360   | 1,630 * | 3,310   | 2,020   | 1,580 * |
| 9          | 1,050   | 1,490   | 1,550   | 1,480   | 978     | 1,590 * | 1,120   | 1,250   | 8,050   | 7,030   | 1,980 * | 1,590   |
| 10         | 1,070   | 1,490   | 1,540   | 1,440   | 724     | 1,230   | 1,360   | 1,320 * | 9,570 * | 4,730   | 1,940   | 1,610   |
| 11         | 1,070   | 1,460   | 1,560   | 1,420   | 844     | 1,220   | 1,120   | 1,410   | 6,850   | 4,100   | 1,980   | 1,620   |
| 12         | 1,070   | 1,460   | 1,590   | 1,420   | 833     | 1,170   | 992     | 918     | 5,760   | 4,590   | 1,960   | 1,630   |
| 13         | 1,080   | 1,450   | 1,580   | 1,500   | 788     | 1,110   | 968 *   | 2,050   | 6,750   | 5,540   | 1,960   | 1,660   |
| 14         | 1,100   | 1,450   | 1,610   | 1,950   | 752     | 1,870   | 773     | 3,380   | 6,670 * | 5,120   | 1,950   | 1,660   |
| 15         | 1,080   | 1,450   | 1,550   | 4,410   | 699     | 1,410 * | 738     | 3,440   | 6,320   | 6,000   | 1,940   | 1,680   |
| 16         | 1,080   | 1,450   | 1,550   | 2,730   | 667     | 2,000   | 717     | 4,410   | 6,320   | 12,100  | 1,950 * | 1,720 * |
| 17         | 1,110   | 1,470 * | 1,520 * | 1,720   | 632     | 1,290   | 869     | 4,910 * | 7,310   | 6,750   | 1,610   | 1,700   |
| 18         | 1,150   | 1,440   | 1,470   | 1,590   | 611     | 1,240   | 763     | 4,410   | 6,750   | 6,220   | 1,360   | 1,270   |
| 19         | 1,130 * | 1,420   | 1,450   | 1,310   | 604 *   | 1,270   | 812     | 2,990   | 6,360   | 4,520 * | 1,270   | 1,220   |
| 20         | 1,130   | 1,370   | 1,500   | 1,230 * | 1,450   | 1,280   | 752 *   | 2,870   | 6,360   | 3,530   | 1,130   | 1,740   |
| 21         | 1,130   | 1,330   | 1,550   | 1,020   | 869     | 1,250   | 703     | 2,760   | 6,250   | 3,330   | 915     | 1,800   |
| 22         | 1,060   | 1,330   | 1,530   | 925     | 798     | 1,230 * | 650     | 2,770   | 6,180 * | 3,920   | 872     | 1,800   |
| 23         | 996     | 1,360   | 1,500   | 936     | 724     | 1,120   | 604     | 3,220   | 6,000   | 3,240   | 865 *   | 1,790   |
| 24         | 706     | 1,360   | 1,500   | 5,830   | 689     | 978     | 586     | 3,210 * | 6,670   | 3,210   | 837     | 1,760   |
| 25         | 530     | 1,360   | 1,530   | 2,560   | 667     | 1,250   | 544     | 3,130   | 7,490   | 2,960   | 802     | 1,780   |
| 26         | 470     | 1,360   | 1,500   | 1,380   | 692     | 1,060   | 611     | 3,060   | 6,780   | 2,280   | 773     | 1,330   |
| 27         | 427     | 1,360   | 1,450   | 1,140 * | 692     | 901     | 802 *   | 2,830   | 5,930   | 2,190 * | 745     | 950     |
| 28         | 385     | 1,360   | 1,500   | 1,150   | 657     | 1,570   | 1,250   | 2,540   | 4,940 * | 2,090   | 720     | 858     |
| 29         | 357 *   |         | 1,480   | 1,230   | 590     | 1,470 * | 1,460   | 2,300   | 3,510   | 2,010   | 696     | 812     |
| 30         | 348     |         | 1,460   | 1,280   | 583     | 1,200   | 1,860   | 2,010   | 3,080   | 2,030   | 678     | 780     |
| 31         | 667     |         | 1,490   |         | 685     |         | 1,520   | 1,800   |         | 2,040   |         | 763     |
| <b>Sum</b> | 37,562  |         | 50,931  |         | 33,228  | 37,148  |         | 71,496  |         | 130,210 |         | 40,390  |
|            | 27,151  |         | 46,130  |         |         | 30,834  |         |         | 154,030 |         | 45,123  |         |

**Current Year 1981**

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet     |     | Average Second-Feet | Total     | Acre-Feet                 |           |           |
|---------------|-------------------|------|-----|-------------------------|-----|---------------------|-----------|---------------------------|-----------|-----------|
|               | High              | Low  | Day | High                    | Low |                     |           | Average                   | Maximum   | Minimum   |
| Jan.          | 3.64              | 2.00 | 18  | 1,150                   | 30  | 348                 | 876       | 53,882                    | 40,054    | 118,276   |
| Feb.          | 4.17              | 3.02 | 9   | 1,520                   | 1   | 777                 | 1,340     | 74,556                    | 35,227    | 111,869   |
| Mar.          | 4.33              | 3.94 | 113 | 1,610                   | 15  | 1,330               | 1,490     | 91,542                    | 52,711    | 211,676   |
| Apr.          | 11.48             | 3.25 | 24  | 11,500                  | 122 | 901                 | 1,700     | 101,012                   | 46,432    | 101,012   |
| May           | 10.79             | 1.67 | 20  | 10,500                  | 19  | 194                 | 1,070     | 65,912                    | 52,192    | 116,801   |
| June          | 6.76              | 2.69 | 14  | 5,360                   | 5   | 562                 | 1,240     | 73,632                    | 56,606    | 192,801   |
| July          | 5.48              | 2.59 | 128 | 3,410                   | 25  | 544                 | 996       | 61,143                    | 77,557    | 194,499   |
| Aug.          | 7.97              | 3.08 | 17  | 6,000                   | 6   | 763                 | 2,310     | 141,849                   | 123,320   | 242,539   |
| Sept.         | 11.71             | 3.61 | 10  | 11,700                  | 4   | 1,060               | 5,120     | 305,531                   | 200,571   | 472,093   |
| Oct.          | 16.60             | 3.81 | 16  | 21,700                  | 4   | 1,580               | 4,200     | 258,250                   | 162,958   | 751,755   |
| Nov.          | 4.49              | 2.66 | 3   | 2,090                   | 30  | 667                 | 1,500     | 89,483                    | 55,098    | 147,392   |
| Dec.          | 4.17              | 2.56 | 121 | 1,840                   | 1   | 657                 | 1,300     | 80,139                    | 36,872    | 80,139    |
| <b>Yearly</b> | 16.60             | 1.67 |     | 21,700                  |     | 194                 | 1,930     | 1,396,931                 | 939,598   | 1,801,958 |
|               | Meters            |      |     | Cubic Meters per Second |     |                     |           | Thousands of Cubic Meters |           |           |
|               | 5.06              | 0.51 |     | 615                     |     | 54.6                | 1,723,097 | 1,158,992                 | 2,222,715 | 618,283   |

\*\* Period 1968-1981      \* Discharge measurement made on this day      ! And other days

**RIO GRANDE AT FOSTER RANCH NEAR LANGTRY, TEXAS  
AND RANCHO SANTA ROSA, COAHUILA**

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, and water-stage recorders (graphic and digital) located on the left bank at latitude 29°46'50", longitude 101°45'30", and river mile 657.5 (1,058.2 km); 500 feet (152 m) downstream from the Terrell-Val Verde County Line, 5.4 river miles (8.8 km) downstream from Lozier Canyon, and about 12.3 miles (19.8 km) west of Langtry, Texas. The zero of the gage is 1,157.17 feet (352.71 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 28 discharge measurements during the year, 24 by the United States Section and 4 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. **Records available: September 1961 through 1981.**

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The concrete control weir was placed in operation on February 21, 1967.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 148,000 second-feet (4,190 m<sup>3</sup>/sec) on November 5, 1978 with a gage height of 38.14 feet (11.63 m). Min. 188 second-feet (5.32 m<sup>3</sup>/sec) on August 19, 1965.

Average Flow in Second-Feet (Cubic Meters per Second)\*#

| Daily:   | Max. 81,600 (2,310) | Sept. 20, 1974 | Min. 217 (6.15) | July 1, 1968 |
|----------|---------------------|----------------|-----------------|--------------|
| Monthly: | Max. 14,700 (416)   | Oct. 1978      | Min. 322 (9.12) | March 1968   |
| Yearly:  | Max. 3,030 (85.8)   | 1978           | Min. 907 (25.7) | 1977         |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.   | March   | April   | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.  |
|------------|---------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| 1          | 883     | 759    | 1,650   | 1,790   | 3,420   | 925     | 2,100   | 1,600   | 2,250   | 3,710   | 2,410   | 1,110 |
| 2          | 840     | 717 *  | 1,650 * | 1,760   | 4,380   | 943     | 2,170   | 1,820   | 2,140   | 3,170   | 2,360 * | 1,110 |
| 3          | 883     | 883    | 1,650   | 1,740   | 1,800   | 1,090   | 1,700   | 1,560 * | 2,240   | 2,450   | 2,270   | 1,110 |
| 4          | 883     | 1,020  | 1,650   | 1,740   | 1,480 * | 1,510   | 1,620   | 1,370   | 2,670   | 2,670   | 2,250   | 1,070 |
| 5          | 883 *   | 1,070  | 1,650   | 1,650   | 2,140   | 1,470   | 1,450   | 1,290   | 1,890   | 2,290 * | 2,260   | 1,070 |
| 6          | 1,160   | 1,110  | 1,650   | 1,590 * | 3,230   | 1,300   | 1,400 * | 1,180   | 1,670   | 2,180   | 2,250   | 1,070 |
| 7          | 1,210   | 1,420  | 1,650   | 1,590   | 3,920   | 1,160   | 1,310   | 1,150   | 1,970   | 7,560   | 2,210   | 1,070 |
| 8          | 1,260   | 1,650  | 1,650   | 1,650   | 4,590   | 1,350   | 1,370   | 1,430   | 2,370 * | 8,020   | 2,210   | 1,070 |
| 9          | 1,310   | 1,710  | 1,640   | 1,740   | 1,960   | 1,990   | 1,510   | 1,200   | 2,040   | 4,030   | 2,210   | 1,070 |
| 10         | 1,370   | 1,710  | 1,730   | 1,800   | 2,000   | 1,550   | 3,520   | 1,430   | 2,890   | 4,940   | 2,210   | 1,530 |
| 11         | 1,310   | 1,770  | 1,790   | 1,740   | 1,580   | 1,750   | 1,450   | 1,660   | 8,620   | 6,390   | 2,190   | 1,770 |
| 12         | 1,370   | 1,770  | 1,890   | 1,740   | 1,760   | 1,380   | 1,460   | 7,630   | 6,990   | 2,190   | 1,830   |       |
| 13         | 1,420   | 1,770  | 1,870   | 1,700   | 1,150   | 1,750   | 1,510   | 2,120   | 6,570   | 7,770 * | 2,200   | 1,830 |
| 14         | 1,420   | 1,770  | 1,850   | 1,870   | 1,210 * | 1,730   | 1,320   | 1,480   | 7,420   | 10,700  | 2,190   | 1,830 |
| 15         | 1,420   | 1,770  | 1,890   | 6,500   | 1,160   | 2,070 * | 1,280   | 2,100   | 7,100   | 5,860   | 2,160   | 1,830 |
| 16         | 1,370   | 1,770  | 1,890 * | 2,550   | 1,130   | 2,550   | 1,200   | 4,700   | 6,820   | 7,310   | 2,160 * | 1,890 |
| 17         | 1,370   | 1,770  | 1,890   | 5,090   | 1,090   | 1,960   | 1,150   | 5,690 * | 6,780   | 10,300  | 2,150   | 1,890 |
| 18         | 1,370   | 1,770  | 1,890   | 2,860   | 1,020 * | 1,960   | 1,080   | 5,970   | 6,960   | 7,910   | 2,140   | 1,890 |
| 19         | 1,420 * | 1,770  | 1,860   | 2,190   | 1,000   | 1,730   | 1,060   | 6,360   | 7,420   | 6,990   | 2,050   | 1,890 |
| 20         | 1,420   | 1,770  | 1,820   | 1,880 * | 929     | 1,580   | 1,130 * | 4,130   | 6,920   | 6,430   | 1,820   | 1,770 |
| 21         | 1,420   | 1,770  | 1,810   | 1,750   | 925     | 1,530   | 1,050   | 3,270   | 6,850 * | 4,660   | 1,750   | 1,470 |
| 22         | 1,370   | 1,710  | 1,760   | 1,530   | 1,710   | 1,560   | 1,060   | 3,020   | 6,850   | 7,910   | 1,660   | 1,770 |
| 23         | 1,370   | 1,650  | 1,820   | 3,740   | 1,590   | 1,520   | 1,010   | 3,030   | 6,710   | 5,400   | 1,530   | 1,890 |
| 24         | 1,370   | 1,650  | 1,820   | 2,790   | 1,120   | 1,480   | 971     | 2,990   | 6,820   | 4,060   | 1,380   | 1,950 |
| 25         | 1,370   | 1,650  | 1,820   | 5,050   | 1,030   | 1,460   | 929     | 3,320   | 7,100   | 3,710   | 1,330   | 1,950 |
| 26         | 1,260   | 1,650  | 1,820   | 6,110   | 964     | 1,300   | 890     | 3,160   | 8,160   | 3,640   | 1,280 * | 1,950 |
| 27         | 1,110   | 1,650  | 1,820   | 2,610   | 925     | 1,190   | 893     | 3,090   | 7,380   | 3,260   | 1,260   | 1,950 |
| 28         | 971     | 1,650  | 1,820   | 1,970   | 925     | 1,120   | 883     | 3,020 * | 6,920   | 2,710   | 1,210   | 1,820 |
| 29         | 883     | 1,810  | 1,650   | 961     | 1,200   | 939     | 2,830   | 6,600   | 2,600   | 2,480   | 1,170   | 1,310 |
| 30         | 840     | 1,730  | 1,540   | 957     | 1,330   | 1,520   | 1,660   | 2,610   | 5,620   | 2,440   | 2,420   | 1,210 |
| 31         | 798     | 1,770  | 929     | 1,070   | 1,560   | 1,660   | 1,070   | 51,103  | 48,450  | 57,670  |         |       |
| <b>Sum</b> | 43,129  | 73,910 | 45,818  | 82,480  | 160,520 |         |         |         |         |         |         |       |
| 37,334     | 55,010  | 52,535 | 42,515  | 163,380 | 57,670  |         |         |         |         |         |         |       |

Current Year 1981

Period 1968-1981

| Month  | Extreme Gage Feet |      |                         | Extreme Second-Feet |                           | Average Second-Feet | Total Acre-Feet | Acre-Feet |         |         |
|--------|-------------------|------|-------------------------|---------------------|---------------------------|---------------------|-----------------|-----------|---------|---------|
|        | High              | Low  | Day                     | High                | Low                       |                     |                 | Average   | Maximum | Minimum |
| Jan.   | 2.59              | 2.17 | 113                     | 1,420               | 31                        | 798                 | 1,200           | 74,031    | 55,796  | 122,084 |
| Feb.   | 2.79              | 2.10 | 111                     | 1,770               | ! 1                       | 717                 | 1,540           | 85,357    | 48,935  | 115,301 |
| Mar.   | 2.85              | 2.69 | 112                     | 1,890               | ! 6                       | 1,590               | 1,770           | 109,067   | 68,148  | 224,767 |
| Apr.   | 5.22              | 2.59 | 15                      | 8,340               | 30                        | 1,420               | 2,460           | 146,598   | 66,845  | 146,598 |
| May    | 6.20              | 2.26 | 2                       | 10,300              | ! 21                      | 925                 | 1,700           | 104,179   | 73,532  | 129,421 |
| June   | 3.35              | 2.23 | 115                     | 2,990               | ! 1                       | 883                 | 1,530           | 90,842    | 80,358  | 251,940 |
| July   | 5.38              | 2.23 | 10                      | 8,660               | ! 26                      | 883                 | 1,370           | 84,341    | 97,720  | 216,916 |
| Aug.   | 5.02              | 2.36 | 19                      | 7,950               | 9                         | 1,070               | 2,660           | 163,577   | 149,377 | 233,664 |
| Sept.  | 5.77              | 2.69 | 11                      | 9,430               | 6                         | 1,590               | 5,440           | 323,973   | 216,345 | 590,037 |
| Oct.   | 7.55              | 2.85 | 14                      | 12,900              | 6                         | 1,890               | 5,190           | 318,426   | 201,980 | 901,825 |
| Nov.   | 3.12              | 2.43 | ! 1                     | 2,410               | 30                        | 1,160               | 1,920           | 114,328   | 86,529  | 357,878 |
| Dec.   | 2.89              | 2.36 | 124                     | 1,950               | ! 4                       | 1,070               | 1,560           | 95,969    | 54,103  | 95,969  |
|        | 7.55              | 2.10 | 12,900                  | 717                 | 2,360                     | 1,710,688           | 1,199,668       | 2,196,111 | 656,287 |         |
| Yearly | Meters            |      | Cubic Meters per Second |                     | Thousands of Cubic Meters |                     |                 |           |         |         |
|        | 2.30              | 0.64 | 366                     | 20.3                | 66.9                      | 2,110,112           | 1,479,789       | 2,708,903 | 809,530 |         |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

## PECOS RIVER NEAR LANGTRY, TEXAS

**DESCRIPTION:** Cableway, concrete control weir, bubbler gage, and water-stage recorders (graphic and digital), located on the right bank at latitude  $29^{\circ}48'10''$ , longitude  $101^{\circ}26'45''$ , about 7.5 miles (12.1 km) east of Langtry, Texas, 9.5 river miles (15.3 km) upstream from the Pecos High Railroad Bridge, and 15.0 river miles (24.1 km) from the confluence with the Rio Grande. This stream enters the Rio Grande at river mile 616.0 (991.4 km); 23.6 river miles (38.0 km) downstream from Langtry, Texas. The zero of the gage is 1,133.08 feet (345.36 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 26 discharge measurements during the year, 22 by the United States Section and 4 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on stable control weir rating curves defined by meter measurements. Records available: July 1967 through 1981. Records are also available for Pecos River near Comstock, 9.5 river miles (15.3 km) downstream, from March 17 through December 3, 1898 and May 1900 through October 7, 1954; for Pecos River near Shumla, 3.5 river miles (5.6 km) upstream, from October 8, 1954 through June 1967; and for Pecos River at Mouth near Comstock, from March 1961 through July 2, 1968.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 577,000 second-feet ( $16,300 \text{ m}^3/\text{sec}$ ) on September 20, 1974 with a gage height of 75.30 feet (22.95 m). The greatest flood of record, which exceeded a gage height of 100 feet (30.5 m) at this station, occurred on June 28, 1954. The peak discharge was 948,000 second-feet ( $26,800 \text{ m}^3/\text{sec}$ ) at the gaging station located near the railroad bridge 9.5 river miles (15.3 km) downstream. Min. 58.3 second-feet (1.65  $\text{m}^3/\text{sec}$ ) on July 27, 1974 with a gage height of 1.47 feet (0.45 m).

Average Flow in Second-Feet (Cubic Meters per Second)

|                             |                |                  |                         |
|-----------------------------|----------------|------------------|-------------------------|
| Daily: Max. 153,000 (4,330) | Sept. 20, 1974 | Min. 59.5 (1.69) | Aug. 20, 21, & 22, 1970 |
| Monthly: Max. 13,500 (382)  | Sept. 1974     | Min. 68.0 (1.93) | August 1970             |
| Yearly: Max. 1,500 (42.5)   | 1974           | Min. 131 (3.71)  | 1970                    |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March  | April  | May    | June  | July   | Aug.  | Sept.  | Oct.     | Nov.  | Dec.  |
|------------|-------|-------|--------|--------|--------|-------|--------|-------|--------|----------|-------|-------|
| 1          | 249   | 204   | 193 *  | 183    | 657    | 477 * | 305    | 226   | 260    | 248      | 403   | 284   |
| 2          | 249   | 204 * | 193 *  | 174    | 4,340  | 438   | 299    | 226   | 272    | 250      | 403   | 284   |
| 3          | 249   | 193   | 212    | 176    | 1,500  | 424   | 287    | 225 * | 285    | 249      | 403   | 284   |
| 4          | 249   | 193   | 223    | 179    | 1,300  | 456   | 284    | 218   | 273    | 249      | 388   | 284   |
| 5          | 237 * | 204   | 173    | 1,060  |        | 516   | 284    | 215   | 270    | 251 *    | 378   | 284   |
| 6          | 237   | 204   | 195 *  | 173    | 897    | 749   | 284 *  | 214   | 274    | 318      | 378   | 284   |
| 7          | 237   | 204   | 193    | 173    | 773    | 597   | 284    | 202   | 272    | 291      | 357   | 284   |
| 8          | 237   | 204   | 191    | 173    | 791    | 487   | 281    | 2,250 | 255 *  | 237      | 353   | 284   |
| 9          | 237   | 204   | 183    | 173    | 710    | 452   | 278    | 593   | 249    | 202      | 337   | 284   |
| 10         | 237   | 204   | 195    | 180    | 667    | 427   | 296    | 388   | 247    | 183      | 331   | 284   |
| 11         | 226   | 193   | 224    | 173    | 643    | 403   | 284    | 334   | 237    | 11,800   | 331   | 284   |
| 12         | 226   | 193   | 258    | 173    | 625    | 399   | 284    | 307   | 237    | 1,230    | 331   | 284   |
| 13         | 226   | 193   | 248    | 171    | 611    | 378   | 279    | 304   | 237    | 18,400 * | 318   | 284   |
| 14         | 226   | 193   | 233    | 183    | 583    | 378   | 272    | 312   | 275    | 978 *    | 309   | 284   |
| 15         | 215   | 193   | 218    | 498    | 572    | 491 * | 269    | 289   | 246    | 526      | 309   | 284   |
| 16         | 215   | 193 * | 215 *  | 1,070  | 565    | 509   | 261    | 291   | 230    | 512      | 309 * | 284 * |
| 17         | 215   | 193 * | 206    | 5,010  | 544    | 427   | 272    | 317   | 226    | 501      | 307   | 284 * |
| 18         | 226   | 193   | 193    | 7,100  | 516 *  | 399   | 263    | 420   | 226    | 494      | 309   | 272   |
| 19         | 226 * | 193   | 183    | 1,350  | 505    | 392 * | 259    | 313   | 226    | 530 *    | 297   | 272   |
| 20         | 226   | 193   | 179    | 918    | 484    | 378   | 249 *  | 297   | 234    | 512      | 297   | 272   |
| 21         | 215   | 193   | 193    | 897    | 456    | 367   | 249    | 299   | 256 *  | 505      | 297   | 272   |
| 22         | 215   | 183   | 193    | 1,050  | 466    | 364   | 249    | 297   | 260    | 636      | 297   | 272 * |
| 23         | 215   | 183   | 183    | 752    | 456    | 367   | 237    | 284   | 249    | 498      | 297   | 272   |
| 24         | 204   | 183   | 183    | 908    | 456    | 353   | 237    | 281   | 249    | 477      | 297   | 272   |
| 25         | 204   | 183   | 179    | 795    | 456    | 333   | 237    | 274   | 249 *  | 456      | 297   | 260   |
| 26         | 215   | 183   | 178 *  | 745    | 452    | 331   | 237    | 272   | 256    | 445      | 297   | 260   |
| 27         | 215   | 183   | 173    | 706    | 427    | 374   | 237    | 273   | 260    | 427      | 284   | 260   |
| 28         | 204   | 193   | 178    | 675    | 406    | 333   | 246    | 277   | 259    | 403      | 284   | 260   |
| 29         | 204   | 178   | 643    | 403    | 311    | 239   | 272    | 249   | 260    | 406      | 284   | 260   |
| 30         | 204   | 178   | 625    | 388    | 309    | 237   | 260    | 249   | 275    | 427      | 284   | 260   |
| 31         | 204   | 183   | 512    |        |        |       | 235    | 260   |        |          |       |       |
| <b>Sum</b> | 5,432 | 6,138 | 26,199 | 23,221 | 12,619 | 8,214 | 10,990 | 7,567 | 43,068 | 9,766    | 8,552 |       |
| 6,944      |       |       |        |        |        |       |        |       |        |          |       |       |

## Current Year 1981

Period July 1967-1981

| Month         | Extreme Gage Feet |      | Extreme Second-Feet            |        | Average Second-Feet | Total                            | Acre-Feet |         |           |
|---------------|-------------------|------|--------------------------------|--------|---------------------|----------------------------------|-----------|---------|-----------|
|               | High              | Low  | Day                            | Day    |                     |                                  | High      | Maximum | Minimum   |
| Jan.          | 2.13              | 2.00 | 1 1                            | 249    | 124                 | 204                              | 224       | 13,762  | 13,124    |
| Feb.          | 2.00              | 1.94 | 1 1                            | 204    | 122                 | 183                              | 194       | 10,780  | 11,507    |
| Mar.          | 2.17              | 1.90 | 12                             | 260    | 120                 | 173                              | 198       | 12,175  | 11,700    |
| Apr.          | 13.68             | 1.87 | 117                            | 19,800 | 1 6                 | 163                              | 872       | 51,960  | 16,731    |
| May           | 11.42             | 2.40 | 2                              | 15,300 | 30                  | 378                              | 749       | 46,055  | 15,606    |
| June          | 3.18              | 2.30 | 15                             | 1,880  | 129                 | 309                              | 420       | 25,024  | 14,020    |
| July          | 2.30              | 2.07 | 1 1                            | 309    | 31                  | 226                              | 265       | 16,299  | 18,233    |
| Aug.          | 5.48              | 1.97 | 8                              | 6,600  | 7                   | 193                              | 353       | 21,798  | 76,891    |
| Sept.         | 2.33              | 2.07 | 14                             | 331    | 116                 | 226                              | 252       | 15,006  | 69,698    |
| Oct.          | 20.83             | 1.87 | 13                             | 58,600 | 110                 | 163                              | 1,390     | 85,480  | 24,322    |
| Nov.          | 2.43              | 2.23 | 1 1                            | 403    | 127                 | 284                              | 325       | 25,399  | 162,055   |
| Dec.          | 2.26              | 2.17 | 111                            | 297    | 117                 | 260                              | 276       | 16,980  | 14,350    |
|               | 20.83             | 1.87 |                                | 58,600 | 163                 | 462                              | 334,681   | 251,874 | 1,087,822 |
| <b>Yearly</b> | <b>Meters</b>     |      | <b>Cubic Meters per Second</b> |        |                     | <b>Thousands of Cubic Meters</b> |           |         |           |
|               | 6.35              | 0.57 |                                | 1,660  | 4.61                | 13.1                             | 412,823   | 310,686 | 1,341,828 |
|               |                   |      |                                |        |                     |                                  |           |         | 116,791   |

\* Discharge measurement made on this day

! And other days

## DEAD MANS CANYON NEAR COMSTOCK, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Pecos River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Dead Mans Canyon.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the left bank of the canyon at latitude  $29^{\circ}47'05''$ , longitude  $101^{\circ}19'25''$ , 2.3 miles (3.7 km) upstream from its confluence with the Pecos River, which is 9.5 miles (15.3 km) upstream from the Pecos River confluence with the Rio Grande. The zero of the gage is 1,178.00 feet (359.05 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: March 1968 through 1981.

**REMARKS:** This stream is normally dry, its flow being confined to periods of storm runoff from its 88 square miles ( $228 \text{ km}^2$ ) of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 37,800 second-feet ( $1,070 \text{ m}^3/\text{sec}$ ) on September 17, 1974 with a gage height of 12.78 feet (3.90 m). Maximum volumes: Monthly, 29,164 acre-feet ( $35,974,000 \text{ m}^3$ ) in September 1974; yearly 30,527 acre-feet ( $37,655,000 \text{ m}^3$ ) in 1974.

Average Flow in Second-Feet (Cubic Meters per Second)

|                          |                |                    |
|--------------------------|----------------|--------------------|
| Daily: Max. 5,850 (166)  | Sept. 18, 1974 | Min. } see REMARKS |
| Monthly: Max. 490 (13.9) | Sept. 1974     | Min. }             |
| Yearly: Max. 42.2 (1.20) | 1974           | Min. }             |

## Mean Daily Discharge in Second-Feet 1981

## Annual Summary

| Month and Day |  |  |  |
|---------------|--|--|--|
| Oct. 13 33.9  |  |  |  |

| Month  | Maximum Gage and Discharge |        |                         | Total Acre-Feet        |
|--------|----------------------------|--------|-------------------------|------------------------|
|        | Day                        | Foot   | Second-Feet             |                        |
| Oct.   | 13                         | 3.84   | 872                     | 67.2                   |
|        |                            | 3.84   | 872                     | 67.2                   |
| Yearly |                            | Meters | Cubic Meters per Second | Thous. of Cubic Meters |
|        |                            | 1.17   | 24.7                    | 82.9                   |

## DOLAN SPRINGS NEAR LOMA ALTA, TEXAS

**DESCRIPTION:** Concrete wall control, bubbler gage, and water-stage recorder located on the left bank of Snake Creek near its mouth, latitude 29°53'40", longitude 100°59'00", and about 12 miles (19.3 km) west of Loma Alta, Val Verde County, Texas. Snake Creek enters Dolan Creek from the left side, 0.9 creek mile (1.4 km) from the confluence with Devils River. Dolan Creek enters Devils River from the left side, 16.8 river miles (27.0 km) upstream from Pafford Crossing, and 42.3 river miles (68.1 km) from the confluence with the Rio Grande. The zero of the gage is 1,338.5 feet (407.97 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 12 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. On October 14, 1981, the concrete wall control was destroyed and the water stage recorder removed. Since then the mean daily discharges have been determined by prorating between measurements. Records available: 1966 through 1981.

**REMARKS:** The flow of these springs is very uniform during periods of dry weather and is not modified by diversions or storage. All storm flow passing this station is deducted and is not included in the tabulation below. This station was established for purposes of correlating the flow of these springs with precipitation data and the flow of other springs in the area.

## EXTREME FLOWS FROM RECORDS:

| Average Flow in Second-Feet (Cubic Meters per Second) |      |      |        |               |      |            |                          |  |  |
|---|------|------|--------|---------------|------|------------|--------------------------|--|--|
| Daily:  | Max. | 25.0 | (0.71) | July 18, 1976 | Min. | 1.0 (0.03) | Several days in May 1971 |  |  |
| Monthly:  | Max. | 20.4 | (0.58) | March 1977    | Min. | 1.1 (0.03) | March, April & May 1971  |  |  |
| Yearly:   | Max. | 17.2 | (0.49) | 1977          | Min. | 1.7 (0.05) | 1968                     |  |  |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March | April | May   | June  | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.  |
|------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|-------|
| 1          | 4.9   | 4.6   | 4.6   | 4.2   | 4.2   | 8.1   | 9.9    | 12.4   | 13.8   | 13.1   | 18.7   | 19.1  |
| 2          | 4.9   | * 4.6 | * 4.6 | 4.2   | 11.7  | 8.1   | 9.9    | 12.4   | 13.8   | 13.1   | * 19.1 | 19.1  |
| 3          | 4.9   | 4.6   | 4.6   | 4.2   | 11.3  | * 8.1 | 9.9    | * 12.7 | 13.8   | 13.1   | 19.1   | 19.1  |
| 4          | 4.9   | 4.6   | 4.6   | 4.2   | * 9.9 | 8.5   | 10.2   | 12.7   | 13.8   | 13.1   | 19.1   | 19.1  |
| 5          | * 4.9 | 4.6   | 4.6   | 4.2   | 9.9   | 8.5   | 10.2   | 12.7   | 14.1   | * 13.1 | 19.1   | 19.1  |
| 6          | 4.9   | 4.6   | 4.6   | * 4.2 | 9.9   | 8.8   | * 10.2 | 12.7   | 14.1   | 13.4   | 19.1   | 19.1  |
| 7          | 4.9   | 4.6   | 4.6   | 4.2   | 9.5   | 8.8   | 10.2   | 12.4   | 14.1   | 13.4   | 19.1   | 19.1  |
| 8          | 4.9   | 4.6   | 4.6   | 4.2   | 9.5   | 8.8   | 10.2   | 13.1   | 14.1   | 13.8   | 19.1   | 19.1  |
| 9          | 4.9   | 4.6   | 4.6   | 4.2   | 9.5   | 8.8   | 10.6   | 12.7   | * 14.1 | 13.8   | 19.1   | 19.1  |
| 10         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 8.8   | 10.6   | 12.7   | 13.8   | 14.1   | * 19.1 | 19.1  |
| 11         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 8.8   | 10.6   | 12.7   | 13.8   | 14.5   | 19.1   | 19.1  |
| 12         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 9.2   | 10.6   | 12.7   | 13.8   | 14.5   | 19.1   | 19.1  |
| 13         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 9.2   | 10.9   | 12.7   | 13.8   | 14.8   | 19.1   | 19.1  |
| 14         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 9.2   | 10.9   | 13.1   | 13.8   | 14.8   | 19.1   | 19.1  |
| 15         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 9.2   | 11.3   | 13.1   | 13.8   | 15.2   | 19.1   | 19.1  |
| 16         | 4.9   | 4.6   | 4.6   | 4.2   | 9.2   | 10.2  | 11.3   | 13.1   | 13.4   | 15.5   | 19.1   | 18.7  |
| 17         | 4.9   | 4.6   | 4.6   | 4.2   | 8.8   | 9.9   | 11.3   | 13.4   | 13.4   | 15.5   | 19.1   | 18.7  |
| 18         | 4.9   | 4.6   | 4.6   | 4.2   | 8.8   | 9.5   | 11.3   | 13.4   | 13.4   | 15.9   | 19.1   | 18.7  |
| 19         | 4.9   | 4.6   | 4.6   | 4.2   | 8.5   | 9.5   | 11.3   | 13.4   | 13.4   | 16.2   | 19.1   | 18.7  |
| 20         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.2   | 11.3   | 13.4   | 13.4   | 16.2   | 19.1   | 18.7  |
| 21         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.2   | 11.7   | 13.4   | 16.6   | 19.1   | 18.7   |       |
| 22         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.2   | 11.7   | 13.1   | 13.4   | 16.6   | 19.1   |       |
| 23         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.5   | 11.7   | 13.1   | 13.4   | 17.0   | 19.1   |       |
| 24         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.5   | 11.7   | 13.1   | 13.4   | 17.3   | 19.1   |       |
| 25         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.5   | 11.7   | 13.1   | 13.4   | 17.3   | 19.1   |       |
| 26         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.5   | 12.0   | 13.1   | 13.4   | 17.7   | 19.1   | 18.7  |
| 27         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.5   | 12.0   | 13.8   | 13.4   | 17.7   | 19.1   | 18.7  |
| 28         | 4.6   | 4.6   | 4.2   | 4.2   | 8.5   | 9.9   | 12.0   | 13.8   | 13.4   | 18.0   | 19.1   | 18.7  |
| 29         | 4.6   | 4.2   | 4.2   | 4.2   | 8.5   | 9.9   | 12.0   | 13.8   | 13.1   | 18.4   | 19.1   | 18.4  |
| 30         | 4.6   | 4.2   | 4.2   | 4.2   | 8.1   | 9.9   | 12.0   | 13.8   | 13.1   | 18.4   | 19.1   | 18.4  |
| 31         | 4.6   | 4.2   | 4.2   | 4.2   | 8.1   | 12.0  | 13.8   | 13.1   | 18.7   | 18.7   |        |       |
| <b>Sum</b> |       | 128.8 |       | 126.0 |       | 274.8 |        | 405.4  |        | 480.8  |        | 584.8 |
|            | 148.3 |       | 137.8 |       | 277.1 |       | 343.2  |        | 408.9  |        | 572.6  |       |

| Month         | Current Year 1981    |      |                                | Period 1966-1981 |                                  |                 |           |         |
|---------------|----------------------|------|--------------------------------|------------------|----------------------------------|-----------------|-----------|---------|
|               | Extreme Gage Feet ** |      | Extreme Second-Feet            |                  | Average Second-Feet              | Total Acre-Feet | Acre-Feet |         |
|               | High                 | Low  | Day                            | Day              |                                  |                 | Average   | Maximum |
| Jan.          |                      |      | ! 1                            | 4.9              | 119                              | 4.6             | 4.9       | 296     |
| Feb.          | 1.51                 | 1.51 | ! 1                            | 4.6              | 4.6                              | 4.6             | 495       | 1,093   |
| Mar.          | 1.51                 | 1.51 | ! 1                            | 4.6              | 120                              | 4.2             | 255       | 401     |
| Apr.          | 1.51                 | 1.51 | ! 1                            | 4.2              | ! 1                              | 4.2             | 274       | 1,255   |
| May           | 1.51                 | 1.21 | 2                              | 12.4             | ! 1                              | 4.2             | 252       | 1,061   |
| June          | 3.90                 | 1.25 | 16                             | 10.2             | ! 1                              | 8.1             | 549       | 420     |
| July          | 1.31                 | 1.25 | 126                            | 12.0             | ! 1                              | 9.9             | 546       | 417     |
| Aug.          | 1.31                 | 1.31 | 127                            | 13.8             | ! 1                              | 12.4            | 681       | 454     |
| Sept.         | 1.31                 | 1.31 | 1.5                            | 14.1             | 129                              | 13.1            | 803       | 542     |
| Oct.          |                      |      | 31                             | Ø 18.7           | ! 1                              | Ø 13.1          | 812       | 557     |
| Nov.          |                      |      | 1 2                            | Ø 19.1           | ! 1                              | Ø 18.7          | 953       | 1,167   |
| Dec.          |                      |      | ! 1                            | Ø 19.1           | 129                              | Ø 18.4          | 638       | 1,177   |
| <b>Yearly</b> |                      |      |                                | Ø 19.1           |                                  | 4.2             | 7,714     | 5,974   |
|               | <b>Meters</b>        |      | <b>Cubic Meters per Second</b> |                  | <b>Thousands of Cubic Meters</b> |                 |           |         |
|               |                      |      |                                | Ø 0.54           | 0.12                             | 0.30            | 9,514     | 7,371   |
|               |                      |      |                                |                  |                                  |                 | 15,348    | 1,551   |

\* Discharge measurement made on this day

\*\* Includes storm flow

Ø Mean daily

! And other days

## DEVILS RIVER AT PAFFORD CROSSING NEAR COMSTOCK, TEXAS

**DESCRIPTION:** Concrete control wall with rectangular notch opening of 900 second-foot ( $25.5 \text{ m}^3/\text{sec}$ ) capacity, cableway, bubbler gage, water-stage recorders (graphic & digital), and binary decimal transmitter located on the left bank at latitude  $29^{\circ}40'35''$ , longitude  $101^{\circ}00'00''$ , about 11.5 miles (18.5 km) east of Comstock, Val Verde County, Texas, and 25.5 river miles (41.0 km) from the confluence with the Rio Grande. The confluence is located at river mile 574.6 (924.7 km), 0.7 river mile (1.1 km) upstream from Amistad Dam. The zero of the gage is 1,131.88 feet (345.00 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 16 discharge measurements during the year, 14 by the United States Section and 2 by the Mexican Section of the Commission, a stable rating curve based on meter measurements, and a continuous record of gage heights. Records available: 1960 through 1981. Records are also available from May 1900 through March 1914 for station 23.8 river miles (38.3 km) downstream; from December 1923 through September 1932 for a station 22.8 river miles (36.7 km) downstream; from September 2, 1932 through August 1957 for a station 21.0 river miles (33.8 km) downstream; from August 7, 1954 through January 1958 for a station 5.4 river miles (8.7 km) upstream; and from August 1954 through May 31, 1968 for a station at the mouth 24.7 river miles (39.8 km) downstream.

**REMARKS:** At this station the flow of this spring-fed stream is very uniform during periods of dry weather and is not modified by diversions or storage. The transmitter relays gage height data upon interrogation from the Amistad Dam hydrographic office of the United States Section of the Commission and is also programmed to relay similar data to this office at predetermined time intervals. Transmission is via radio.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 250,000 second-feet ( $7,080 \text{ m}^3/\text{sec}$ ) on September 18, 1974 with a gage height of 19.82 feet (6.04 m). Min. 48.6 second-feet (1.38  $\text{m}^3/\text{sec}$ ) on August 20, 1969.

Average Flow in Second-Feet (Cubic Meters per Second)

|  | Daily   | Max. 123,000 (3,480) | Sept. 18, 1974 | Min. 53.7 (1.52) | August 20, 1969 |
|--|---------|----------------------|----------------|------------------|-----------------|
|  | Monthly | Max. 8,460 (240)     | Sept. 1974     | Min. 64.3 (1.82) | August 1964     |
|  | Yearly  | Max. 977 (27.7)      | 1974           | Min. 99.9 (2.83) | 1968            |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March  | April  | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov. | Dec. |
|------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|
| 1          | 252   | 237   | 252    | 209    | 348    | 348    | 403    | 331    | 348    | 348    | 547  | 466  |
| 2          | 252   | 237   | 237    | 213    | 3,740  | 348    | 403    | 331    | 351    | 348    | 558  | 466  |
| 3          | 252   | 237   | 223    | 219    | 2,190  | 348    | 399    | 331    | 360    | 348    | 540  | 466  |
| 4          | 252   | 237   | 223    | 218    | 777    | 378    | 385    | 331    | 348    | 348    | 533  | 448  |
| 5          | 252   | 237   | 223    | 209    | 558    | 392    | 434    | 331    | 357    | 348    | 526  | 448  |
| 6          | 252   | 237   | 223    | 209    | 498    | 396    | 420    | 331    | 357    | 381    | 526  | 448  |
| 7          | 252   | 237   | 223    | 214    | 473    | 374    | 385    | 334    | 348    | 459    | 519  | 448  |
| 8          | 252   | 237   | 232    | 217    | 466    | 364    | 371    | 348    | 348    | 399    | 509  | 448  |
| 9          | 252   | 237   | 262    | 223    | 445    | 348    | 367    | 364    | 364    | 399    | 501  | 448  |
| 10         | 252   | 237   | 209    | 223    | 424    | 348    | 367    | 349    | 364    | 399    | 494  | 448  |
| 11         | 252   | 237   | 237    | 223    | 413    | 348    | 367    | 348    | 364    | 47,300 | 494  | 448  |
| 12         | 252   | 237   | 267    | 223    | 410    | 351    | 367    | 348    | 364    | 10,600 | 487  | 466  |
| 13         | 252   | 237   | 252    | 215    | 420    | 338    | 378    | 348    | 364    | 5,260  | 480  | 466  |
| 14         | 252   | 237   | 237    | 208    | 413    | 326    | 385    | 348    | 381    | 3,710  | 473  | 448  |
| 15         | 252   | 237   | 237    | 251    | 399    | 512    | 374    | 348    | 392    | 1,280  | 463  | 448  |
| 16         | 252   | 237   | 223    | 251    | 399    | 4,450  | 367    | 348    | 360    | 915    | 473  | 448  |
| 17         | 252   | 237   | 223    | 269    | 396    | 1,680  | 367    | 348    | 348    | 788    | 480  | 448  |
| 18         | 252   | 237   | 221    | 816    | 381    | 551    | 367    | 374    | 348    | 692    | 480  | 448  |
| 19         | 252   | 237   | 211    | 477    | 364    | 505    | 367    | 364    | 348    | 636    | 463  | 448  |
| 20         | 252   | 237   | 204    | 410    | 364    | 480    | 367    | 364    | 348    | 607    | 463  | 448  |
| 21         | 267   | 237   | 209    | 396    | 364    | 459    | 367    | 364    | 348*   | 600    | 463  | 448  |
| 22         | 267   | 237   | 214    | 413    | 364    | 448    | 367    | 364    | 348    | 632    | 463  | 434  |
| 23         | 267   | 223   | 223    | 403    | 364    | 445    | 364    | 364    | 348    | 600    | 463  | 434  |
| 24         | 252   | 223   | 220    | 392    | 364    | 431    | 348    | 364    | 348    | 576    | 463  | 434  |
| 25         | 252   | 223   | 217    | 385    | 364    | 427    | 348    | 357    | 348    | 572    | 463  | 434  |
| 26         | 252   | 223   | 223    | 374    | 360    | 431    | 351    | 348    | 348    | 572    | 463  | 434  |
| 27         | 252   | 237   | 214    | 374    | 348    | 420    | 367    | 351    | 348    | 562    | 463  | 434  |
| 28         | 252   | 237   | 223    | 378    | 348    | 413    | 364    | 348    | 348    | 554    | 463  | 434  |
| 29         | 252   | 218   | 360    | 353    | 399    | 360    | 360    | 348    | 348    | 540    | 463  | 434  |
| 30         | 252   | 209   | 348    | 353    | 399    | 360    | 360    | 348    | 348    | 526*   | 456  | 434  |
| 31         | 237   | 214   | 353    | 331    | 348    | 331    | 348    | 348    | 348    | 530    | 463  | 434  |
| <b>Sum</b> | 6,580 | 9,320 | 17,813 | 17,457 | 11,567 | 10,852 | 10,642 | 81,829 | 14,632 | 13,838 |      |      |
|            | 7,842 | 7,003 |        |        |        |        |        |        |        |        |      |      |

| Current Year 1981 |                   |      |                     |                         |                     | Period 1960-1981 |                           |         |         |
|-------------------|-------------------|------|---------------------|-------------------------|---------------------|------------------|---------------------------|---------|---------|
| Month             | Extreme Gage Feet |      | Extreme Second-Feet |                         | Average Second-Feet | Total Acre-Feet  | Acre-Feet                 |         |         |
|                   | High              | Low  | Day                 | Day                     |                     |                  | Average                   | Maximum | Minimum |
| Jan.              | 1.71              | 1.64 | 121                 | 267                     | 31                  | 237              | 253                       | 14,466  | 28,842  |
| Feb.              | 1.64              | 1.61 | 1                   | 237                     | 122                 | 223              | 13,068                    | 12,403  | 25,287  |
| Mar.              | 1.74              | 1.54 | 9                   | 283                     | 20                  | 196              | 226                       | 12,448  | 26,404  |
| Apr.              | 3.02              | 1.54 | 18                  | 1,490                   | 14                  | 196              | 311                       | 18,483  | 38,777  |
| May               | 5.18              | 1.84 | 2                   | 15,000                  | 1                   | 331              | 576                       | 35,344  | 4,520   |
| June              | 4.66              | 1.80 | 16                  | 9,680                   | 113                 | 315              | 583                       | 34,633  | 35,344  |
| July              | 2.03              | 1.84 | 5                   | 434                     | 31                  | 331              | 374                       | 21,714  | 54,328  |
| Aug.              | 2.00              | 1.84 | 18                  | 420                     | 1                   | 331              | 350                       | 22,943  | 4,034   |
| Sept.             | 2.33              | 1.87 | 15                  | 576                     | 1                   | 348              | 353                       | 21,530  | 48,908  |
| Oct.              | 14.47             | 1.84 | 11                  | 142,000                 | 3                   | 331              | 2,640                     | 162,407 | 3,955   |
| Nov.              | 2.30              | 2.07 | 1                   | 558                     | 30                  | 448              | 487                       | 29,020  | 50,004  |
| Dec.              | 2.10              | 2.03 | 1                   | 466                     | 122                 | 434              | 448                       | 27,472  | 33,013  |
|                   | 14.47             | 1.54 | 142,000             |                         | 196                 | 574              | 415,468                   | 266,032 | 4,694   |
| Yearly            | Meters            |      |                     | Cubic Meters per Second |                     |                  | Thousands of Cubic Meters |         |         |
|                   | 4.41              | 0.47 | 4,020               | 5.54                    | 16.3                | 512,474          | 328,151                   | 872,198 | 89,421  |

\* Discharge measurement made on this day

! And other days

## BIG SATAN CREEK NEAR COMSTOCK, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Big Satan Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank of the creek at latitude 29°39'50", longitude 100°57'50", 1.1 miles (1.8 km) upstream from its confluence with the Devils River, which is 21.2 miles (34.1 km) upstream from the Devils River confluence with the Rio Grande. The zero of the gage is 1,134.00 feet (345.64 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: May 1968 through 1981.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 42 square miles ( $109 \text{ km}^2$ ) of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 56,100 second-feet ( $1,590 \text{ m}^3/\text{sec}$ ) on August 15, 1971 with a gage height of 12.31 feet (3.75 m). Maximum volumes: Monthly, 12,204 acre-feet ( $15,054,000 \text{ m}^3$ ) in August 1971; yearly 12,525 acre-feet ( $15,450,000 \text{ m}^3$ ) in 1971.

Average Flow in Second-Feet (Cubic Meters per Second)

|  | Daily   | Max. 4,480 (127) | Aug. 15, 1971 | Min. | see REMARKS |
|--|---------|------------------|---------------|------|-------------|
|  | Monthly | Max. 198 (5.61)  | Aug. 1971     | Min. |             |
|  | Yearly  | Max. 17.3 (0.49) | 1971          | Min. |             |

### Mean Daily Discharge in Second-Feet 1981

### Annual Summary

| Month and Day |  |  |  |
|---------------|--|--|--|
| June 16 0.4   |  |  |  |

| Month | Maximum Gage and Discharge |        |                         | Total<br>Acre-Feet    |
|-------|----------------------------|--------|-------------------------|-----------------------|
|       | Day                        | Feet   | Second-Feet             |                       |
| June  | 16                         | 1.05   | 1.4                     | 0.7                   |
|       |                            | 1.05   | 1.4                     | 0.7                   |
|       | Yearly                     | Meters | Cubic Meters per Second | Thous. of Cub. Meters |
|       |                            | 0.32   | 0.04                    | 0.9                   |

## ROUGH CANYON NEAR DEL RIO, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Rough Canyon.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank at latitude 29°34'40", longitude 100°56'00", 3.9 miles (6.3 km) upstream from its confluence with the Devils River, which is 11.1 miles (17.9 km) upstream from the Devils River confluence with the Rio Grande. The zero of the gage is 1,129.00 feet (344.12 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: January 1968 through 1981.

**REMARKS:** This stream is normally dry, its flow being confined to periods of storm runoff from its 24 square miles ( $62.2 \text{ km}^2$ ) of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 7,040 second-feet ( $199 \text{ m}^3/\text{sec}$ ) on August 12, 1972 with a gage height of 6.80 feet (2.07 m). Maximum volumes: Monthly, 8,230 acre-feet ( $10,152,000 \text{ m}^3$ ) in August 1971; yearly 8,232.2 acre-feet ( $10,154,000 \text{ m}^3$ ) in 1971.

Average Flow in Second-Feet (Cubic Meters per Second)

|  | Daily   | Max. 2,140 (60.6) | Aug. 16, 1971 | Min. | see REMARKS |
|--|---------|-------------------|---------------|------|-------------|
|  | Monthly | Max. 134 (3.79)   | Aug. 1971     | Min. |             |
|  | Yearly  | Max. 11.4 (0.32)  | 1971          | Min. |             |

### Mean Daily Discharge in Second Feet 1981

### Annual Summary

| Month and Day |             |  |  |
|---------------|-------------|--|--|
| Apr. 23 13.4  | June 15 0.4 |  |  |
| 24 .4         | 16 14.8     |  |  |

| Month | Maximum Gage and Discharge |        |                         | Total<br>Acre-Feet    |
|-------|----------------------------|--------|-------------------------|-----------------------|
|       | Day                        | Feet   | Second-Feet             |                       |
| Apr.  | 23                         | 1.31   | 73.5                    | 27.3                  |
|       | 24                         | 1.25   | 50.9                    | 30.2                  |
|       | Yearly                     | 1.31   | 73.5                    | 57.5                  |
|       |                            | Meters | Cubic Meters per Second | Thous. of Cub. Meters |
|       |                            | 0.40   | 2.08                    | 70.9                  |

## NORTH FORK SAN PEDRO CREEK NEAR DEL RIO, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on the north fork of San Pedro Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank of the creek at latitude  $29^{\circ}31'20''$ , longitude  $100^{\circ}53'00''$ , 3 miles (4.8 km) upstream from its confluence with the Middle Fork Branch, which is 6.3 miles (10.1 km) upstream from its confluence with Devils River, which itself is 4.5 river miles (7.2 km) above the Devils River confluence with the Rio Grande. The zero of the gage is 1,126.92 feet (343.49 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: January 1968 through 1981.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 17 square miles ( $44 \text{ km}^2$ ) of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 5,070 second-feet (144  $\text{m}^3/\text{sec}$ ) on August 12, 1972 with a gage height of 8.44 feet (2.57 m). Maximum volumes: Monthly, 3,403 acre-feet ( $4,198,000 \text{ m}^3$ ) in October 1969; yearly 4,061.7 acre-feet (5,010,000  $\text{m}^3$ ) in 1969.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |              |                    |
|----------|-------------------|--------------|--------------------|
| Daily:   | Max. 1,240 (35.1) | Oct. 4, 1969 | Min. } see REMARKS |
| Monthly: | Max. 55.3 (1.57)  | Oct. 1969    | Min. }             |
| Yearly:  | Max. 5.6 (0.16)   | 1969         |                    |

## Mean Daily Discharge in Second-Feet 1981

## Annual Summary

| Month and Day |              |  |  |
|---------------|--------------|--|--|
| Apr. 21 5.3   | June 16 23.3 |  |  |

| Month        | Maximum Gage and Discharge |        |                            | Total<br>Acre-Feet       |
|--------------|----------------------------|--------|----------------------------|--------------------------|
|              | Day                        | Feet   | Second-Feet                |                          |
| Apr.<br>June | 21                         | 1.31   | 51.2                       | 10.5                     |
|              | 16                         | 1.44   | 89.3                       | 46.2                     |
|              |                            | 1.44   | 89.3                       | 56.7                     |
| Yearly       |                            | Meters | Cubic Meters<br>per Second | Thous. of<br>Cub. Meters |
|              |                            | 0.44   | 2.53                       | 70.0                     |
|              |                            |        |                            |                          |

## MIDDLE FORK SAN PEDRO CREEK NEAR DEL RIO, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on the middle fork of San Pedro Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank of the creek at latitude  $29^{\circ}29'30''$ , longitude  $100^{\circ}52'50''$ , 3.2 miles (5.1 km) upstream from its confluence with the North Fork Branch which is 6.3 miles (10.1 km) above the confluence with Devils River, which itself is 4.5 river miles (7.2 km) above the Devils River confluence with the Rio Grande. The zero of the gage is 1,132.02 feet (345.04 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: December 1967 through 1981.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 12 square miles ( $31 \text{ km}^2$ ) of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 10,200 second-feet ( $289 \text{ m}^3/\text{sec}$ ) on July 17, 1975 with a gage height of 5.84 feet (1.78 m). Maximum volumes: Monthly, 3,726 acre-feet ( $4,596,000 \text{ m}^3$ ) in July 1975; yearly 3,726 acre-feet ( $4,596,000 \text{ m}^3$ ) in 1975.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |               |                    |
|----------|-------------------|---------------|--------------------|
| Daily:   | Max. 1,390 (39.4) | July 17, 1975 | Min. } see REMARKS |
| Monthly: | Max. 60.6 (1.72)  | July 1975     | Min. }             |
| Yearly:  | Max. 5.1 (0.14)   | 1975          | Min. }             |

## Mean Daily Discharge in Second Feet 1981

## Annual Summary

| Month and Day |             |  |  |
|---------------|-------------|--|--|
| June 16 81.9  | June 20 1.1 |  |  |
| 17 .7         | 21 1.1      |  |  |
| 18 .4         | 22 1.1      |  |  |
| 19 1.1        | 23 .4       |  |  |

| Month | Maximum Gage and Discharge |        |                            | Total<br>Acre-Feet       |
|-------|----------------------------|--------|----------------------------|--------------------------|
|       | Day                        | Feet   | Second-Feet                |                          |
| June  | 16                         | 2.00   | 357                        | 173                      |
|       |                            | 2.00   | 357                        | 173                      |
|       |                            | Meters | Cubic Meters<br>per Second | Thous. of<br>Cub. Meters |
|       |                            | 0.61   | 10.1                       | 214                      |

## EVANS CREEK NEAR COMSTOCK, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Evans Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the left bank of the creek at latitude 29° 32' 15", longitude 101° 06' 10", 11.0 miles (17.7 km) upstream from its confluence with Devils River, which is 3.2 miles (5.1 km) upstream from the Devils River confluence with the Rio Grande. The zero of the gage is 1,162.54 feet (354.34 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: December 1967 through 1981.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 74 square miles ( $192 \text{ km}^2$ ) of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 17,400 second-feet (493 m<sup>3</sup>/sec) on June 12, 1971 with a gage height of 5.99 feet (1.83 m). Maximum volumes: Monthly, 9,281 acre-feet (11,448,000 m<sup>3</sup>) in August 1971; yearly 14,404 acre-feet (17,767,000 m<sup>3</sup>) in 1971.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                  |               |      |             |
|----------|------------------|---------------|------|-------------|
| Daily:   | Max. 3,940 (112) | Aug. 15, 1971 | Min. | see REMARKS |
| Monthly: | Max. 151 (4.28)  | Aug. 1971     | Min. |             |
| Yearly:  | Max. 19.9 (0.56) | 1971          | Min. |             |

## Mean Daily Discharge in Second Feet 1981

## Annual Summary

| Month and Day |        |                         |             | Maximum Gage and Discharge | Total Acre-Feet |
|---------------|--------|-------------------------|-------------|----------------------------|-----------------|
| Month         | Day    | Feet                    | Second-Feet |                            |                 |
| Apr. 17       | 17     | 1.08                    | 15.2        | 1.4                        | 186             |
|               | 14     | 1.77                    | 632         | 187.4                      |                 |
| Yearly        |        | 1.77                    | 632         |                            |                 |
|               | Meters | Cubic Meters per Second |             | Thous. of Cub. Meters      |                 |
|               | 0.54   | 17.9                    |             | 231.7                      |                 |

## CARMINA SPRINGS NEAR CD. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 70.6 second-foot (2.0 m<sup>3</sup>/sec) capacity and staff gage located on a creek that runs almost parallel to Amistad Dam, about 130 feet (40 m) from the confluence with the Rio Grande, at latitude 29°26'50", longitude 101°03'35", and about 11.0 miles (17.7 km) northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river mile 573.7 (923.2 km), 0.2 river mile (400 m) downstream from Amistad Dam and 12.6 river miles (20.3 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1981.

**REMARKS:** At least six separate springs have emerged on the watershed of this small creek since operation of Amistad Dam began in May 1968. Prior to this time, flow in this creek was exclusively from storm runoff. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below. On September 24, 1971, a flood destroyed part of the weir.

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb.    | March   | April   | May     | June    | July    | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|------|---------|---------|---------|---------|---------|---------|------|-------|------|------|------|
| 1          | 48.4 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 59.3 | 55.8  | 55.8 | 56.9 | 63.9 |
| 2          | 48.4 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 58.6 | 55.8  | 56.2 | 57.2 | 63.6 |
| 3          | 48.4 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 57.9 | 55.8  | 56.5 | 57.9 | 63.2 |
| 4          | 48.4 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 57.2 | 56.5  | 56.5 | 58.3 | 62.9 |
| 5          | 48.4 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.9 | 56.9  | 56.9 | 58.6 | 62.5 |
| 6          | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.9 | 57.6  | 56.9 | 58.6 | 62.5 |
| 7          | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.9 | 57.9  | 57.2 | 59.0 | 62.2 |
| 8          | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.5 | 58.6  | 57.2 | 59.3 | 61.8 |
| 9          | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.5 | 59.3  | 57.2 | 59.7 | 61.4 |
| 10         | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.5 | 58.6  | 57.6 | 60.0 | 61.8 |
| 11         | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.5 | 57.9  | 57.6 | 60.0 | 61.8 |
| 12         | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.5 | 56.9  | 57.6 | 60.4 | 62.2 |
| 13         | 48.7 | 47.7    | 47.7    | 47.7    | 49.8    | 60.0    | 60.0    | 56.2 | 56.2  | 57.6 | 60.7 | 62.5 |
| 14         | 48.7 | 47.7    | 47.7    | 49.4    | 49.8    | 60.0    | 60.0    | 56.2 | 55.4  | 57.6 | 60.7 | 62.9 |
| 15         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 56.2 | 54.7  | 57.9 | 61.1 | 62.9 |
| 16         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 56.2 | 53.7  | 57.9 | 61.4 | 63.2 |
| 17         | 48.7 | 47.7    | 47.7    | 51.9    | 49.8    | 60.0    | 60.0    | 56.2 | 53.0  | 57.9 | 61.4 | 63.2 |
| 18         | 48.7 | 47.7    | 47.7    | 53.0    | 49.8    | 60.0    | 60.0    | 55.8 | 53.3  | 57.9 | 61.8 | 63.6 |
| 19         | 48.7 | 47.7    | 47.7    | 53.0    | 49.8    | 60.0    | 60.0    | 55.8 | 53.3  | 57.9 | 62.2 | 63.6 |
| 20         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.8 | 53.7  | 58.3 | 62.9 | 63.6 |
| 21         | 48.0 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.8 | 53.7  | 58.3 | 63.2 | 63.6 |
| 22         | 48.0 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.8 | 54.0  | 57.9 | 63.6 | 63.9 |
| 23         | 48.0 | 47.7    | 47.7    | 53.0    | 49.8    | 60.0    | 60.0    | 55.4 | 54.4  | 57.6 | 63.9 | 63.9 |
| 24         | 48.0 | 47.7    | 47.7    | 51.9    | 49.8    | 60.0    | 60.0    | 55.4 | 54.4  | 57.2 | 64.6 | 64.3 |
| 25         | 48.0 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.4 | 54.7  | 56.9 | 65.0 | 64.6 |
| 26         | 48.0 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.4 | 54.7  | 56.5 | 64.6 | 65.0 |
| 27         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.4 | 55.1  | 56.2 | 64.6 | 65.3 |
| 28         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.4 | 55.4  | 55.8 | 64.3 | 65.7 |
| 29         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.4 | 55.4  | 55.4 | 64.3 | 65.7 |
| 30         | 48.7 | 47.7    | 47.7    | 51.2    | 49.8    | 60.0    | 60.0    | 55.8 | 55.8  | 55.8 | 63.9 | 66.0 |
| 31         | 48.7 | 47.7    | 47.7    | 49.8    | 49.8    | 60.0    | 55.8    | 56.5 |       |      |      |      |
| <b>Sum</b> |      | 1,335.6 | 1,495.5 | 1,800.0 | 1,745.6 | 1,770.3 | 1,969.3 |      |       |      |      |      |
| 1,504.0    |      | 1,478.7 | 1,543.8 | 1,860.0 | 1,668.5 | 1,840.1 |         |      |       |      |      |      |

| Current Year 1981 |                   |     |                         |      |                     |                 |                           |         |         | Period 1969-1981 |        |  |
|-------------------|-------------------|-----|-------------------------|------|---------------------|-----------------|---------------------------|---------|---------|------------------|--------|--|
| Month             | Extreme Gage Feet |     | Extreme Second-Feet     |      | Average Second-Feet | Total Acre-Feet | Acre-Feet                 |         |         |                  |        |  |
|                   | High              | Low | Day                     | High | Low                 |                 | Average                   | Maximum | Minimum |                  |        |  |
| Jan.              |                   |     | ! 6                     | 48.7 | 121                 | 48.0            | 48.4                      | 2,985   | 2,632   | 3,707            | 364    |  |
| Feb.              |                   |     | ! 1                     | 47.7 | 11                  | 47.7            | 47.7                      | 2,648   | 2,420   | 3,405            | 373    |  |
| Mar.              |                   |     | ! 1                     | 47.7 | 11                  | 47.7            | 47.7                      | 2,932   | 2,599   | 3,621            | 525    |  |
| Apr.              |                   |     | ! 18                    | 53.0 | 11                  | 47.7            | 49.8                      | 2,966   | 2,503   | 3,497            | 629    |  |
| May               |                   |     | ! 1                     | 49.8 | 11                  | 49.8            | 49.8                      | 3,062   | 2,538   | 3,492            | 709    |  |
| June              |                   |     | ! 1                     | 60.0 | 11                  | 60.0            | 60.0                      | 3,572   | 2,489   | 3,572            | 598    |  |
| July              |                   |     | ! 1                     | 60.0 | 11                  | 60.0            | 60.0                      | 3,691   | 2,547   | 3,691            | 533    |  |
| Aug.              |                   |     | 1                       | 59.3 | 123                 | 55.4            | 56.2                      | 3,463   | 2,619   | 3,463            | 540    |  |
| Sept.             |                   |     | 9                       | 59.3 | 17                  | 53.0            | 55.8                      | 3,309   | 2,606   | 3,377            | 593    |  |
| Oct.              |                   |     | ! 20                    | 58.3 | 29                  | 55.4            | 57.2                      | 3,511   | 2,812   | 3,816            | 830    |  |
| Nov.              |                   |     | 25                      | 65.0 | 1                   | 56.9            | 61.4                      | 3,650   | 2,769   | 3,685            | 964    |  |
| Dec.              |                   |     | ! 30                    | 66.0 | 9                   | 61.4            | 63.6                      | 3,906   | 2,900   | 3,906            | 1,077  |  |
| Yearly            |                   |     |                         | 66.0 |                     | 47.7            | 54.7                      | 39,695  | 31,434  | 41,290           | 9,080  |  |
|                   | Meters            |     | Cubic Meters per Second |      |                     |                 | Thousands of Cubic Meters |         |         |                  |        |  |
|                   |                   |     |                         | 1.87 |                     | 1.35            | 1.55                      | 48,961  | 38,773  | 50,932           | 11,201 |  |

Ø Mean daily

I And other days

**LOURDES AND HILDA SPRINGS  
NEAR CD. ACUNA, COAHUILA**

**LOURDES SPRING**

**DESCRIPTION:** Rectangular sharp-crested weir of 28.8 second-foot (815 l/sec) capacity and staff gage located at latitude  $29^{\circ}26'35''$ , longitude  $101^{\circ}03'30''$ , at the base of the high bank of the Rio Grande, and about 11.1 miles (17.9 km) northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river mile 573.2 (922.5 km), 12.2 river miles (19.6 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 926.28 feet (282.33 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1981.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted. The daily flow throughout the year ranged from 1.4 (0.04) to 2.5 second-feet (0.07 m<sup>3</sup>/sec) and averaged 1.6 second-feet (0.05 m<sup>3</sup>/sec). The volume for the year amounted to 1,154.0 acre-feet (1,423,000 m<sup>3</sup>).

**HILDA SPRING**

**DESCRIPTION:** Rectangular sharp-crested weir of 53.0 second-foot (1.50 m<sup>3</sup>/sec) capacity and staff gage located at latitude  $29^{\circ}26'20''$ , longitude  $101^{\circ}03'35''$ , about 328 feet (100 m) from the confluence with the Rio Grande and about 11.0 miles (17.7 km) northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river mile 572.8 (921.8 km), 11.8 river miles (19.0 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 908.14 feet (276.80 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1981.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted. The daily flow throughout the year ranged from 2.8 (0.08) to 3.2 second-feet (0.09 m<sup>3</sup>/sec) and averaged 2.9 second-feet (0.08 m<sup>3</sup>/sec). The volume for the year amounted to 2,080 acre-feet (2,566,000 m<sup>3</sup>).

In order to determine what effect storage in Amistad Reservoir has on the flow of various Mexican springs in the vicinity of Amistad Dam, gaging stations were established in November 1961 at Ernestina and Rosita Springs. The station at Rosita Spring was discontinued in June 1976. The station at Ernestina was discontinued in March 1981.

**RIO GRANDE BELOW AMISTAD DAM NEAR CD. ACUNA, COAHUILA  
AND DEL RIO, TEXAS**

**DESCRIPTION:** Cableway, gravity well, concrete control weir, and water-stage recorders (graphic and digital), and binary decimal transmitter located on the left bank at latitude  $29^{\circ}25'30''$ , longitude  $101^{\circ}02'25''$ , and river mile 571.8 (920.3 km), 2.2 river miles (3.4 km) downstream from Amistad Dam and 10.8 river miles (17.4 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 898.94 feet (274.00 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 24 discharge measurements during the year, 12 by the Mexican Section and 12 by the United States Section of the Commission, and continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: September 1954 through 1981. Records are also available from May 1900 through April 1915 for a station 1.9 miles (3 km) upstream; from December 1919 through March 1920 for a station 1.7 miles (3 km) downstream near McKee's Switch; from July 2, 1941 through August 1954 and October 1960 through 1967 for a station at the international highway bridge; and from December 1923 through July 2, 1941, and 1968 through 1981 for a station approximately 10.6 miles (17.0 km) downstream.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. On May 31, 1968 Amistad Dam started impounding water. After this day, flow at this station is controlled largely by releases from Amistad Reservoir, 2.1 river miles (3.3 km) upstream. The transmitter relays gage height data upon interrogation by telephone via private line to the Amistad office.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,158,000 second-feet ( $32,800 \text{ m}^3/\text{sec}$ ) on June 28, 1954, determined by slope-area computation, with a gage height of 55.72 feet (16.98 m) at the old station site 500 feet ( $152 \text{ m}$ ) downstream. This is the greatest rate of discharge recorded at any point on the Rio Grande. Max. since Amistad Dam, 62,200 second-feet ( $1,760 \text{ m}^3/\text{sec}$ ) on Sept. 21, 1974. Min. 22.2 second-feet ( $0.63 \text{ m}^3/\text{sec}$ ) on February 14, 1969 with a gage height of 1.08 feet (0.33 m).

|        |      |        |         |                |      |      | Average Flow in Second-Feet (Cubic Meters per Second) |                |          |      |        |       |            |      |      |        |           |         |      |       |       |      |      |     |        |      |
|--------|------|--------|---------|----------------|------|------|---|----------------|----------|------|--------|-------|------------|------|------|--------|-----------|---------|------|-------|-------|------|------|-----|--------|------|
| Daily: | Max. | 61,100 | (1,730) | Sept. 22, 1974 | Min. | 46.6 | (1.32)  | April 13, 1971 | Monthly: | Max. | 21,500 | (609) | Sept. 1974 | Min. | 60.7 | (1.72) | Oct. 1971 | Yearly: | Max. | 4,910 | (139) | 1974 | Min. | 576 | (16.3) | 1972 |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.    | March   | April  | May   | June    | July    | Aug.    | Sept.   | Oct.     | Nov.    | Dec.    |
|------------|---------|---------|---------|--------|-------|---------|---------|---------|---------|----------|---------|---------|
| 1          | 1,970   | 1,830   | 1,600   | 1,920  | 865   | 713     | 3,070   | 840     | 1,720   | 1,120    | 1,870   | 2,030   |
| 2          | 1,970   | 1,830   | 1,630   | 2,290  | 876   | 713     | 3,060   | 837     | 1,630   | 1,140    | 1,870   | 1,740   |
| 3          | 1,970   | 1,830   | 1,620   | 2,320  | 876   | 742     | 3,050   | 840     | 4,590   | 1,120    | 1,870   | 1,740 * |
| 4          | 1,970   | 1,830   | 1,610   | 2,320  | 826   | 1,750   | 3,040   | 851     | 4,270   | 1,120    | 1,870   | 1,760   |
| 5          | 1,970   | 1,830   | 1,640   | 2,320  | 763   | 2,640   | 3,040   | 675     | 3,530   | 1,090    | 1,870   | 1,740   |
| 6          | 1,970   | 1,830   | 1,640   | 2,320  | 763   | 2,930   | 3,060   | 1,200   | 5,190   | 1,140    | 1,870   | 1,740   |
| 7          | 1,970   | 1,830   | 1,640   | 2,240  | 735   | 2,030   | 3,080   | 1,380   | 5,160   | 1,290    | 1,870   | 1,740   |
| 8          | 1,970   | 1,830   | 1,630   | 2,190  | 724   | 2,030   | 3,070 * | 1,570   | 3,810   | 1,440    | 1,870   | 1,740   |
| 9          | 1,980   | 1,830   | 1,650   | 2,190  | 717   | 2,030   | 2,790   | 1,560   | 3,190   | 1,440    | 1,870   | 1,730   |
| 10         | 1,980   | 1,830   | 1,630   | 2,190  | 724   | 2,030   | 2,390   | 1,550   | 4,240 * | 1,440 *  | 1,870   | 1,720   |
| 11         | 1,980   | 1,840   | 1,630   | 2,190  | 717   | 2,330   | 2,380   | 1,550   | 4,270   | 5,010    | 1,860   | 1,740   |
| 12         | 1,990   | 1,850   | 1,640   | 2,190  | 724   | 2,500 * | 2,380   | 1,580   | 4,270   | 13,100   | 1,870 * | 1,740   |
| 13         | 1,990   | 1,730   | 1,640   | 2,190  | 724 * | 2,500   | 2,370   | 1,610   | 4,270   | 13,100   | 1,870   | 1,740   |
| 14         | 1,990   | 1,660   | 1,630   | 2,240  | 727   | 2,500   | 2,370   | 1,940   | 6,640   | 13,200   | 1,870   | 1,740   |
| 15         | 1,990 * | 1,660   | 1,630   | 2,830  | 844   | 2,600   | 1,470   | 2,190   | 8,400   | 13,100   | 1,870   | 1,760   |
| 16         | 1,560   | 1,660   | 1,640   | 3,600  | 1,300 | 2,900   | 2,320   | 2,190   | 8,400   | 10,100 * | 1,870   | 1,760 * |
| 17         | 1,300   | 1,680   | 1,640   | 3,710  | 1,300 | 3,100   | 2,350   | 2,980   | 8,400   | 6,820    | 1,870   | 1,760   |
| 18         | 1,670   | 1,680 * | 1,640 * | 3,670  | 1,050 | 3,070   | 2,330   | 5,330   | 8,400   | 6,850    | 1,870   | 1,760   |
| 19         | 1,900   | 1,640   | 1,640   | 3,670  | 699   | 3,070 * | 2,320   | 7,130   | 8,400   | 7,130    | 1,870 * | 1,760   |
| 20         | 1,850   | 1,630   | 1,650 * | 3,670  | 692   | 3,070   | 2,360   | 7,130 * | 8,400   | 7,590    | 1,870   | 1,750   |
| 21         | 1,840   | 1,630   | 1,640   | 3,670  | 766 * | 3,070   | 2,130   | 7,770   | 8,400   | 7,630    | 1,870   | 1,780   |
| 22         | 1,840   | 1,630   | 1,640   | 3,670  | 939   | 3,110   | 1,840   | 8,790   | 8,400   | 7,630    | 1,880   | 1,730   |
| 23         | 1,840   | 1,640   | 1,650   | 3,780  | 939   | 3,110   | 1,630   | 8,790   | 7,240   | 7,590    | 1,890   | 1,220   |
| 24         | 1,840   | 1,640   | 1,660   | 3,710  | 872   | 3,110   | 1,550   | 6,530   | 6,320   | 7,590    | 1,890   | 1,230   |
| 25         | 1,830   | 1,630   | 1,640   | 3,710  | 788   | 3,110   | 1,510   | 7,170   | 6,320   | 7,590    | 1,900   | 1,230   |
| 26         | 1,830   | 1,630   | 1,640   | 3,710  | 706   | 3,110   | 1,520   | 1,700   | 6,320   | 6,220    | 1,910   | 1,230   |
| 27         | 1,830   | 1,620   | 1,640   | 3,710  | 710   | 3,110   | 1,530   | 1,590   | 6,320   | 3,010    | 1,910   | 1,230   |
| 28         | 1,830   | 1,610   | 1,640   | 2,520  | 710   | 3,070   | 1,530 * | 1,960   | 6,220   | 1,830    | 1,910   | 1,230   |
| 29         | 1,830   |         | 1,640   | 925    | 625   | 3,070   | 1,240   | 1,940   | 5,260   | 1,820    | 2,150   | 1,230   |
| 30         | 1,830   |         | 1,640   | 915    | 752   | 3,070   | 858     | 2,420   | 5,090   | 1,850    | 1,640   | 1,210   |
| 31         | 1,830   |         | 1,650   | 749    |       |         | 840     | 2,220   |         | 1,870    |         | 1,230   |
| <b>Sum</b> |         | 48,360  |         | 82,580 |       | 75,288  |         | 90,413  |         | 162,970  |         | 49,440  |
|            |         | 58,110  |         | 50,750 |       | 25,202  |         | 68,478  |         | 173,070  |         | 56,340  |

| Current Year 1981 |                   |      |                                |        |                     |                 | Period 1968–1981                 |           |           |           |         |
|-------------------|-------------------|------|--------------------------------|--------|---------------------|-----------------|----------------------------------|-----------|-----------|-----------|---------|
| Month             | Extreme Gage Feet |      | Extreme Second-Feet            |        | Average Second-Feet | Total Acre-Feet | Acre-Feet                        |           |           |           |         |
|                   | High              | Low  | Day                            | Day    | Day                 |                 | Average                          | Maximum   | Minimum   |           |         |
| Jan.              | 1.64              | 1.28 | 13                             | 2,110  | 116                 | 1,300           | 1,880                            | 115,351   | 76,760    | 145,106   | 5,318   |
| Feb.              | 1.54              | 1.44 | 12                             | 1,860  | 127                 | 1,610           | 1,730                            | 95,969    | 115,215   | 467,202   | 12,467  |
| Mar.              | 1.48              | 1.41 | 9                              | 1,720  | 14                  | 1,590           | 1,640                            | 100,627   | 126,765   | 396,457   | 7,271   |
| Apr.              | 2.33              | 1.02 | 17                             | 4,130  | 29                  | 865             | 2,750                            | 163,843   | 103,626   | 342,129   | 27,570  |
| May               | 1.28              | .39  | 115                            | 1,300  | 29                  | 166             | 812                              | 49,984    | 187,489   | 506,848   | 24,137  |
| June              | 2.17              | .92  | 15                             | 3,600  | 11                  | 713             | 2,510                            | 149,260   | 149,142   | 327,602   | 16,418  |
| July              | 2.00              | .33  | 9                              | 3,110  | 15                  | 112             | 2,210                            | 135,881   | 132,665   | 366,470   | 23,182  |
| Aug.              | 3.48              | .30  | 22                             | 8,790  | 5                   | 101             | 2,920                            | 179,344   | 153,638   | 662,215   | 15,589  |
| Sept.             | 3.48              | .30  | 2                              | 8,790  | 2                   | 107             | 5,760                            | 343,384   | 226,994   | 1,280,079 | 17,606  |
| Oct.              | 4.46              | 1.18 | 14                             | 13,300 | 1                   | 1,090           | 5,260                            | 323,203   | 173,445   | 812,596   | 3,734   |
| Nov.              | 1.77              | .33  | 30                             | 2,490  | 30                  | 131             | 1,880                            | 111,813   | 99,806    | 502,295   | 4,539   |
| Dec.              | 1.77              | 1.21 | 1                              | 2,490  | 31                  | 1,190           | 1,590                            | 97,979    | 73,021    | 216,286   | 4,859   |
| Yearly            | 4.46              | 0.30 |                                | 13,300 |                     | 101             | 2,580                            | 1,866,638 | 1,618,566 | 3,566,066 | 416,788 |
|                   | <b>Meters</b>     |      | <b>Cubic Meters per Second</b> |        |                     |                 | <b>Thousands of Cubic Meters</b> |           |           |           |         |
|                   | 1.36              | 0.09 |                                | 377    |                     | 2.87            | 73.0                             | 2,302,474 | 1,996,478 | 4,398,694 | 514,104 |

\* Discharge measurement made on this day      † And other days

## SPRING M-15 AND SPRING M-5 NEAR CD. ACUNA, COAHUILA

## SPRING M-15

**DESCRIPTION:** Rectangular sharp-crested weir of 8.1 second-foot (230 l/sec) capacity and staff gage located at latitude  $29^{\circ}25'20''$ , longitude  $101^{\circ}02'40''$ , about 1,300 feet (400 m) from the confluence with the Rio Grande and about 9.4 miles (15.1 km) northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river mile 571.3 (919.4 km), 10.3 river miles (16.6 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 925.13 feet (281.98 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1981.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below.

| Current Year 1981 |                   |               |                       |                                |     |                     |                                  |           | Period 1969-1981 |         |         |
|-------------------|-------------------|---------------|-----------------------|--------------------------------|-----|---------------------|----------------------------------|-----------|------------------|---------|---------|
| Month             | Extreme Gage Feet |               | @ Extreme Second-Feet |                                |     | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |                  |         |         |
|                   | High              | Low           | Day                   | High                           | Low |                     |                                  | Average   | Maximum          | Minimum |         |
| Jan.              |                   |               |                       | 1 1                            | 1.1 | 1 1                 | 1.1                              | 1.1       | 64.9             | 77.8    | 131     |
| Feb.              |                   |               |                       | 1 1                            | 1.1 | 1 1                 | 1.1                              | 1.1       | 59.2             | 69.7    | 123     |
| Mar.              |                   |               |                       | 1 1                            | 1.1 | 116                 | .7                               | .7        | 54.3             | 71.3    | 122     |
| Apr.              |                   |               |                       | 126                            | 1.4 | 1 1                 | .7                               | 1.1       | 56.7             | 70.5    | 105     |
| May               |                   |               |                       | 1 1                            | 1.4 | 118                 | 1.1                              | 1.4       | 77.0             | 75.4    | 109     |
| June              |                   |               |                       | 1 1                            | 1.1 | 1 1                 | 1.1                              | 1.1       | 65.5             | 65.7    | 121     |
| July              |                   |               |                       | 1 1                            | 1.1 | 1 1                 | 1.1                              | 1.1       | 67.6             | 68.1    | 106     |
| Aug.              |                   |               |                       | 130                            | 1.4 | 1 1                 | 1.1                              | 1.2       | 74.8             | 66.4    | 122     |
| Sept.             |                   |               |                       | 1 1                            | 1.4 | 1 1                 | 1.4                              | 1.4       | 83.3             | 68.5    | 105     |
| Oct.              |                   |               |                       | 1 1                            | 1.4 | 130                 | .8                               | 1.2       | 71.8             | 70.6    | 117     |
| Nov.              |                   |               |                       | 129                            | 1.1 | 1 3                 | .7                               | .9        | 52.0             | 70.6    | 124     |
| Dec.              |                   |               |                       | 1 1                            | 1.1 | 1 1                 | 1.1                              | 1.1       | 67.6             | 78.5    | 131     |
|                   |                   |               |                       | 1.4                            |     | 0.7                 |                                  | 1.1       | 794.7            | 853.1   | 1,362.2 |
| <b>Yearly</b>     |                   | <b>Meters</b> |                       | <b>Cubic Meters per Second</b> |     |                     | <b>Thousands of Cubic Meters</b> |           |                  |         |         |
|                   |                   |               |                       | 0.04                           |     | 0.02                |                                  | 0.03      | 980              | 1,052   | 1,679   |
|                   |                   |               |                       |                                |     |                     |                                  |           |                  |         |         |
|                   |                   |               |                       |                                |     |                     |                                  |           |                  |         |         |

## SPRING M-5

**DESCRIPTION:** Rectangular sharp-crested weir of 17.7 second-foot (500 l/sec) capacity and staff gage located at latitude  $29^{\circ}25'20''$ , longitude  $101^{\circ}02'35''$ , at the base of the high bank of the Rio Grande, and about 9.2 miles (14.8 km) northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river mile 571.1 (919.1 km), 10.1 river miles (16.3 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 932.38 feet (284.19 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1981.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below.

| Current Year 1981 |                   |               |                       |                                |     |                     |                                  |           | Period 1969-1981 |         |       |
|-------------------|-------------------|---------------|-----------------------|--------------------------------|-----|---------------------|----------------------------------|-----------|------------------|---------|-------|
| Month             | Extreme Gage Feet |               | @ Extreme Second-Feet |                                |     | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |                  |         |       |
|                   | High              | Low           | Day                   | High                           | Low |                     |                                  | Average   | Maximum          | Minimum |       |
| Jan.              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 173              | 157     | 195   |
| Feb.              |                   |               |                       | 1 5                            | 3.2 | 1 1                 | 2.8                              | 3.2       | 173              | 142     | 173   |
| Mar.              |                   |               |                       | 1 1                            | 3.2 | 116                 | 2.8                              | 2.8       | 184              | 152     | 184   |
| Apr.              |                   |               |                       | 116                            | 3.2 | 1 1                 | 2.8                              | 2.8       | 178              | 147     | 178   |
| May               |                   |               |                       | 1 1                            | 3.2 | 118                 | 2.8                              | 3.2       | 186              | 153     | 186   |
| June              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 167              | 143     | 168   |
| July              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 172              | 145     | 173   |
| Aug.              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 172              | 151     | 195   |
| Sept.             |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 167              | 149     | 189   |
| Oct.              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 172              | 154     | 195   |
| Nov.              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 167              | 150     | 189   |
| Dec.              |                   |               |                       | 1 1                            | 2.8 | 1 1                 | 2.8                              | 2.8       | 172              | 154     | 195   |
|                   |                   |               |                       | 3.2                            |     | 2.8                 |                                  | 2.9       | 2,083            | 1,797   | 2,148 |
| <b>Yearly</b>     |                   | <b>Meters</b> |                       | <b>Cubic Meters per Second</b> |     |                     | <b>Thousands of Cubic Meters</b> |           |                  |         |       |
|                   |                   |               |                       | 0.09                           |     | 0.08                |                                  | 0.08      | 2,569            | 2,217   | 2,653 |
|                   |                   |               |                       |                                |     |                     |                                  |           |                  |         |       |

Ø Mean daily

! And other days

## ARROYO DE LOS JABONCILLOS NEAR CD. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 70.6 second-foot ( $2 \text{ m}^3/\text{sec}$ ) capacity and staff gage located at latitude  $29^{\circ}24'25''$ , longitude  $101^{\circ}02'20''$ , about 660 feet (200 m) from the confluence with the Rio Grande, and about 8.6 miles (13.8 km) northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river mile 507.0 (918.2 km), 9.5 river miles (15.3 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1981.

**REMARKS:** At least 9 separate springs have emerged along this creek since operation of Amistad Dam began in May 1968. Prior to this time, flow in this creek was exclusively from storm runoff. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below.

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.           | Feb.           | March          | April          | May            | June           | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|----------------|----------------|----------------|----------------|----------------|----------------|------|------|-------|------|------|------|
| 1          | 60.4           | 56.5           | 59.3           | 57.9           | 67.1           | 63.6           | 61.1 | 58.6 | 59.3  | 61.8 | 64.3 | 65.0 |
| 2          | 60.4           | 56.5           | 59.3           | 57.9           | 67.1           | 62.5           | 61.8 | 57.9 | 59.3  | 61.8 | 64.3 | 65.0 |
| 3          | 60.4           | 55.8           | 59.7           | 57.9           | 67.1           | 63.2           | 61.1 | 57.9 | 59.7  | 61.8 | 64.3 | 65.0 |
| 4          | 60.4           | 55.8           | 59.7           | 57.2           | 67.1           | 65.3           | 60.7 | 57.6 | 59.3  | 61.1 | 64.3 | 65.0 |
| 5          | 60.4           | 55.8           | 59.7           | 55.8           | 67.1           | 65.3           | 60.7 | 57.2 | 59.0  | 61.1 | 64.3 | 65.0 |
| 6          | 60.4           | 55.1           | 59.7           | 55.8           | 67.5           | 63.6           | 60.4 | 57.9 | 58.6  | 62.5 | 64.3 | 65.0 |
| 7          | 60.4           | 55.1           | 59.3           | 55.8           | 66.7           | 63.6           | 60.4 | 57.6 | 57.9  | 62.5 | 64.3 | 65.0 |
| 8          | 60.4           | 54.4           | 57.9           | 57.2           | 66.0           | 63.6           | 60.4 | 58.6 | 57.9  | 61.1 | 63.2 | 65.0 |
| 9          | 60.4           | 54.4           | 58.6           | 56.5           | 64.6           | 63.6           | 61.1 | 57.6 | 59.0  | 61.1 | 61.8 | 65.0 |
| 10         | 60.4           | 54.4           | 58.6           | 56.5           | 63.2           | 63.6           | 60.7 | 57.2 | 59.3  | 61.1 | 62.5 | 65.0 |
| 11         | 59.3           | 54.4           | 60.4           | 55.8           | 63.6           | 63.6           | 60.0 | 56.9 | 58.6  | 61.1 | 65.0 | 65.0 |
| 12         | 59.3           | 54.4           | 60.4           | 55.8           | 63.6           | 63.6           | 59.7 | 57.6 | 58.6  | 61.1 | 65.0 | 65.0 |
| 13         | 58.6           | 54.4           | 60.4           | 55.8           | 64.6           | 63.6           | 59.3 | 58.3 | 57.2  | 61.1 | 65.0 | 65.0 |
| 14         | 58.6           | 54.4           | 59.3           | 60.4           | 64.3           | 63.6           | 58.6 | 57.9 | 59.3  | 61.1 | 65.0 | 65.7 |
| 15         | 58.6           | 54.4           | 57.9           | 70.3           | 65.0           | 63.6           | 59.3 | 57.6 | 59.3  | 61.1 | 65.0 | 65.7 |
| 16         | 58.6           | 53.7           | 57.9           | 70.3           | 64.6           | 71.3           | 59.3 | 57.9 | 59.3  | 61.1 | 65.0 | 65.7 |
| 17         | 58.6           | 53.7           | 57.9           | 70.3           | 62.9           | 69.9           | 59.3 | 59.0 | 59.3  | 61.1 | 65.7 | 65.7 |
| 18         | 58.6           | 53.7           | 57.2           | 70.3           | 61.4           | 69.2           | 58.6 | 59.7 | 59.3  | 61.1 | 66.4 | 65.7 |
| 19         | 58.6           | 55.1           | 57.2           | 70.3           | 61.1           | 67.8           | 58.6 | 60.7 | 59.3  | 61.1 | 65.0 | 65.7 |
| 20         | 58.6           | 55.8           | 57.2           | 70.3           | 62.5           | 67.1           | 57.9 | 60.7 | 59.3  | 61.1 | 65.0 | 65.7 |
| 21         | 58.6           | 56.5           | 57.2           | 68.9           | 64.3           | 67.1           | 57.6 | 60.0 | 59.3  | 61.1 | 65.7 | 65.7 |
| 22         | 58.6           | 57.2           | 56.5           | 68.9           | 63.2           | 67.1           | 58.3 | 58.6 | 59.3  | 64.3 | 65.0 | 65.7 |
| 23         | 57.9           | 57.9           | 56.5           | 68.9           | 63.2           | 65.0           | 59.0 | 57.6 | 59.3  | 64.3 | 65.0 | 65.7 |
| 24         | 57.9           | 59.3           | 57.2           | 68.9           | 63.2           | 63.9           | 58.3 | 56.5 | 58.6  | 64.3 | 65.0 | 65.7 |
| 25         | 57.9           | 60.4           | 57.9           | 68.9           | 63.2           | 64.6           | 58.3 | 56.9 | 57.9  | 64.3 | 65.7 | 66.0 |
| 26         | 57.2           | 60.4           | 57.9           | 68.9           | 62.2           | 63.6           | 58.6 | 58.6 | 57.9  | 64.3 | 65.0 | 66.4 |
| 27         | 57.2           | 60.4           | 57.9           | 67.1           | 62.9           | 63.6           | 61.4 | 59.7 | 57.6  | 64.3 | 65.0 | 66.4 |
| 28         | 57.2           | 60.4           | 57.9           | 67.1           | 63.9           | 62.5           | 61.1 | 59.3 | 57.6  | 64.3 | 65.0 | 66.7 |
| 29         | 57.2           |                | 57.9           | 68.2           | 64.3           | 61.8           | 60.4 | 60.4 | 57.9  | 64.3 | 65.0 | 67.1 |
| 30         | 57.2           |                | 57.9           | 67.1           | 65.7           | 60.7           | 60.4 | 61.1 | 57.9  | 64.3 | 64.3 | 67.1 |
| 31         | 57.2           |                | 57.9           | 65.0           |                | 65.7           | 59.3 | 59.7 |       | 64.3 |      | 67.1 |
| <b>Sum</b> | <b>1,570.3</b> | <b>1,901.0</b> | <b>1,941.1</b> | <b>1,812.8</b> | <b>1,931.0</b> | <b>2,034.5</b> |      |      |       |      |      |      |
|            | <b>1,825.5</b> | <b>1,810.3</b> | <b>1,998.2</b> | <b>1,851.7</b> | <b>1,762.1</b> | <b>1,940.4</b> |      |      |       |      |      |      |

| Current Year 1981 |                   |     |                     |      |                     |         |                 |           |         | Period 1969-1981          |        |  |
|-------------------|-------------------|-----|---------------------|------|---------------------|---------|-----------------|-----------|---------|---------------------------|--------|--|
| Month             | Extreme Gage Feet |     | Extreme Second-Feet |      | Average Second-Feet |         | Total Acre-Feet | Acre-Feet |         |                           |        |  |
|                   | High              | Low | Day                 | High | Low                 | Average |                 | Average   | Maximum | Minimum                   |        |  |
| Jan.              |                   |     | ! 1                 | 60.4 | 126                 | 57.2    | 59.0            | 3,621     | 3,383   | 4,720                     | 349    |  |
| Feb.              |                   |     | 125                 | 60.4 | 116                 | 53.7    | 56.2            | 3,114     | 3,084   | 4,207                     | 381    |  |
| Mar.              |                   |     | ! 11                | 60.4 | 122                 | 56.5    | 58.3            | 3,591     | 3,343   | 4,574                     | 526    |  |
| Apr.              |                   |     | 115                 | 70.3 | 1 5                 | 55.8    | 63.2            | 3,770     | 3,232   | 4,345                     | 636    |  |
| May               |                   |     | ! 1                 | 67.5 | 19                  | 61.1    | 64.6            | 3,964     | 3,291   | 4,540                     | 721    |  |
| June              |                   |     | 16                  | 71.3 | 130                 | 60.7    | 64.6            | 3,850     | 3,069   | 4,071                     | 678    |  |
| July              |                   |     | 2                   | 61.8 | 21                  | 57.6    | 59.7            | 3,673     | 3,120   | 4,357                     | 769    |  |
| Aug.              |                   |     | 29                  | 61.1 | 24                  | 56.5    | 58.6            | 3,595     | 3,208   | 4,321                     | 782    |  |
| Sept.             |                   |     | 3                   | 59.7 | 13                  | 57.2    | 58.6            | 3,496     | 3,253   | * 4,417                   | 782    |  |
| Oct.              |                   |     | ! 22                | 64.3 | ! 4                 | 61.1    | 62.2            | 3,829     | 3,575   | ** 5,211                  | 1,097  |  |
| Nov.              |                   |     | 18                  | 66.4 | 9                   | 61.8    | 64.6            | 3,848     | 3,542   | 4,847                     | 1,282  |  |
| Dec.              |                   |     | ! 29                | 67.1 | ! 1                 | 65.0    | 65.7            | 4,035     | 3,649   | 4,709                     | 1,398  |  |
|                   |                   |     |                     | 71.3 |                     | 53.7    | 61.3            | 44,386    | 39,749  | 51,839                    | 9,850  |  |
| Yearly Meters     |                   |     |                     |      |                     |         |                 |           |         | Thousands of Cubic Meters |        |  |
|                   |                   |     |                     |      |                     |         |                 | 54,750    | 49,030  | 63,943                    | 12,152 |  |

θ Mean daily

! And other days

\* Partly estimated

" Estimated

**ARROYO DEL BUEY AND ARROYO DE LA TREINTA Y UNA  
NEAR CD. ACUNA, COAHUILA**

ARROYO DEL BUEY

**DESCRIPTION:** Cipolletti weir of 35.3 second-foot ( $1 \text{ m}^3/\text{sec}$ ) capacity, located at latitude  $29^{\circ}24'20''$ , longitude  $101^{\circ}02'25''$ , 0.2 creek mile (300 m) from the confluence with the Rio Grande, and about 8.5 miles (13.7 km) northwest of Cd. Acuna, Coahuila. This stream enters the Rio Grande from the Mexican side at river mile 570.4 (918.0 km), 3.5 river miles (5.6 km) downstream from Amistad Dam and 9.4 river miles (15.2 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: November 1961 through 1981.

**REMARKS:** The flow of this stream is not modified by diversions or storage. Prior to 1969 discharges were based on a continuous record of gage heights and the weir discharge table. Storm flow is deducted and not included in the tabulation below. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir will have on the flow of this stream. At approximately 0.3 creek mile (0.5 km) upstream from the weir four springs have emerged since Amistad Reservoir storage began. Backwater from the Rio Grande will affect the flow of this stream when the flow in the river is approximately 20,000 second-feet ( $566 \text{ m}^3/\text{sec}$ ).

| Month         | Current Year 1981 |     |                       |      |                     |                                | Period # Nov. 1961-1981 |         |                                  |       |
|---------------|-------------------|-----|-----------------------|------|---------------------|--------------------------------|-------------------------|---------|----------------------------------|-------|
|               | Extreme Gage Feet |     | Ø Extreme Second-Feet |      | Average Second-Feet | Total Acre-Feet                | Acre-Feet               |         |                                  |       |
|               | High              | Low | Day                   | High |                     |                                | Average                 | Maximum | Minimum                          |       |
| Jan.          |                   |     |                       | ! 1  | 7.1                 | 7.1                            | 435                     | 289     | 528                              | 6.8   |
| Feb.          |                   |     |                       | ! 1  | 7.1                 | ! 5                            | 375                     | 261     | 477                              | 5.4   |
| Mar.          |                   |     |                       | ! 1  | 6.7                 | 6.7                            | 413                     | 283     | 520                              | 9.3   |
| Apr.          |                   |     |                       | 126  | 8.8                 | ! 1                            | 6.7                     | 462     | 311                              | 540   |
| May           |                   |     |                       | ! 1  | 8.8                 | 128                            | 7.4                     | 504     | 296                              | 6.3   |
| June          |                   |     |                       | ! 1  | 7.4                 | ! 1                            | 7.4                     | 440     | 293                              | 544   |
| July          |                   |     |                       | ! 1  | 7.4                 | ! 1                            | 7.4                     | 455     | 282                              | 492   |
| Aug.          |                   |     |                       | ! 1  | 7.4                 | ! 1                            | 7.4                     | 455     | 307                              | 503   |
| Sept.         |                   |     |                       | 129  | 8.3                 | ! 1                            | 7.4                     | 465     | 315                              | 517   |
| Oct.          |                   |     |                       | ! 5  | 8.5                 | 129                            | 7.6                     | 498     | 338                              | 493   |
| Nov.          |                   |     |                       | ! 1  | 7.5                 | ! 3                            | 7.4                     | 441     | 298                              | 544   |
| Dec.          |                   |     |                       | ! 1  | 7.4                 | 127                            | 7.1                     | 446     | 300                              | 515   |
|               |                   |     |                       | 8.8  |                     | 6.7                            | 5,389                   | 3,573   | 6,031                            | 216.8 |
| <b>Yearly</b> |                   |     | <b>Meters</b>         |      |                     | <b>Cubic Meters per Second</b> |                         |         | <b>Thousands of Cubic Meters</b> |       |
|               |                   |     |                       | 0.25 |                     | 0.19                           | 0.21                    | 6,647   | 4,407                            | 7,438 |

ARROYO DE LA TREINTA Y UNA

**DESCRIPTION:** Cipolletti weir of 35.3 second-foot ( $1 \text{ m}^3/\text{sec}$ ) capacity, located at latitude  $29^{\circ}22'35''$ , longitude  $101^{\circ}01'15''$ , 0.6 creek mile (900 m) from the confluence with the Rio Grande, and about 6.5 miles (10.5 km) northwest of Cd. Acuna, Coahuila. This stream enters the Rio Grande from the Mexican side at river mile 567.6 (913.5 km), 6.3 river miles (10 km) downstream from Amistad Dam and 6.6 river miles (10.6 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: May 1961 through 1981.

**REMARKS:** The flow of this stream is very uniform during periods of dry weather and is not modified by diversions or storage. Prior to 1969 discharges were based on a continuous record of gage heights and the weir discharge table. Storm flow is deducted and not included in tabulation below. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir will have on the flow of this stream. It is estimated that backwater from the Rio Grande will affect the flow at this station only during times of extremely high releases.

| Month         | Current Year 1981 |     |                       |      |                     |                                | Period # May 1961-1981 |         |                                  |       |
|---------------|-------------------|-----|-----------------------|------|---------------------|--------------------------------|------------------------|---------|----------------------------------|-------|
|               | Extreme Gage Feet |     | Ø Extreme Second-Feet |      | Average Second-Feet | Total Acre-Feet                | Acre-Feet              |         |                                  |       |
|               | High              | Low | Day                   | High |                     |                                | Average                | Maximum | Minimum                          |       |
| Jan.          |                   |     |                       | ! 1  | 3.2                 | ! 1                            | 3.2                    | 195     | 161                              | 282   |
| Feb.          |                   |     |                       | ! 1  | 3.2                 | ! 1                            | 3.2                    | 177     | 146                              | 257   |
| Mar.          |                   |     |                       | 116  | 3.5                 | ! 16                           | 3.2                    | 207     | 161                              | 327   |
| Apr.          |                   |     |                       | 128  | 4.6                 | ! 1                            | 3.5                    | 237     | 173                              | 302   |
| May           |                   |     |                       | ! 1  | 4.6                 | 123                            | 3.9                    | 262     | 164                              | 262   |
| June          |                   |     |                       | ! 1  | 3.9                 | ! 1                            | 3.9                    | 232     | 150                              | 254   |
| July          |                   |     |                       | ! 1  | 3.9                 | 129                            | 3.3                    | 221     | 151                              | 253   |
| Aug.          |                   |     |                       | 130  | 3.5                 | ! 3                            | 3.2                    | 204     | 160                              | 323   |
| Sept.         |                   |     |                       | 125  | 3.8                 | ! 1                            | 3.5                    | 217     | 175                              | 273   |
| Oct.          |                   |     |                       | ! 3  | 3.9                 | 127                            | 3.5                    | 229     | 183                              | 282   |
| Nov.          |                   |     |                       | ! 1  | 3.5                 | ! 2                            | 3.4                    | 205     | 166                              | 273   |
| Dec.          |                   |     |                       | ! 1  | 3.5                 | ! 1                            | 3.5                    | 215     | 168                              | 282   |
|               |                   |     |                       | 4.6  |                     | 3.2                            | 3.6                    | 2,601   | 1,958                            | 3,264 |
| <b>Yearly</b> |                   |     | <b>Meters</b>         |      |                     | <b>Cubic Meters per Second</b> |                        |         | <b>Thousands of Cubic Meters</b> |       |
|               |                   |     |                       | 0.13 |                     | 0.09                           | 0.10                   | 3,208   | 2,415                            | 4,025 |

Ø Mean daily

# Some months missing

! And other days

## MARIS SPRING NEAR CD. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 106 second-foot ( $3 \text{ m}^3/\text{sec}$ ) capacity and staff gage located at the spring about 100 feet (30 m) from the right bank of the Rio Grande at latitude  $29^\circ 24' 00''$ , longitude  $101^\circ 01' 40''$ , and about 8 miles (12.9 km) northwest of Cd. Acuna, Coahuila. This spring enters the Rio Grande at river mile 569.9 (917.2 km), 8.9 river miles (14.3 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila and 4.0 river miles (6 km) downstream from Amistad Dam. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: November 14, 1961 through 1981.

**REMARKS:** The flow of this spring is very uniform during periods of dry weather and is not modified by diversions or storage. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir will have on the flow of this spring. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below. Prior to May 1969 the weir had an 11.1 second-foot (315 l/sec) capacity.

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March | April | May   | June  | July  | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|------|------|
| 1          | 8.5   | 8.1   | 7.8   | 7.4   | 24.0  | 18.7  | 18.0  | 13.1 | 10.6  | 9.2  | 9.2  | 8.8  |
| 2          | 8.5   | 8.1   | 7.8   | 7.4   | 25.1  | 18.0  | 18.0  | 13.1 | 10.9  | 9.2  | 9.2  | 8.8  |
| 3          | 8.5   | 8.1   | 7.8   | 7.4   | 25.4  | 18.0  | 17.7  | 13.1 | 10.9  | 9.2  | 9.2  | 8.8  |
| 4          | 8.5   | 8.1   | 7.8   | 7.4   | 24.4  | 17.3  | 17.3  | 12.7 | 10.9  | 9.2  | 9.2  | 8.8  |
| 5          | 8.5   | 8.1   | 7.8   | 7.4   | 24.0  | 18.7  | 17.3  | 12.7 | 10.6  | 8.8  | 9.2  | 8.8  |
| 6          | 8.5   | 8.1   | 7.4   | 7.4   | 23.3  | 18.0  | 16.6  | 12.7 | 9.9   | 9.5  | 9.2  | 8.8  |
| 7          | 8.5   | 8.1   | 7.4   | 7.4   | 23.3  | 17.7  | 16.2  | 12.7 | 9.9   | 9.5  | 9.2  | 8.8  |
| 8          | 8.5   | 8.1   | 7.4   | 7.4   | 22.6  | 17.0  | 16.2  | 12.0 | 9.9   | 9.5  | 9.2  | 8.8  |
| 9          | 8.5   | 8.1   | 7.4   | 7.4   | 22.6  | 16.6  | 16.2  | 12.0 | 11.3  | 9.5  | 9.2  | 8.8  |
| 10         | 8.5   | 8.1   | 7.4   | 7.4   | 22.2  | 16.6  | 15.9  | 12.0 | 10.9  | 9.5  | 9.2  | 8.8  |
| 11         | 8.5   | 7.8   | 7.4   | 7.4   | 21.5  | 16.6  | 15.9  | 11.7 | 10.9  | 9.5  | 9.2  | 8.8  |
| 12         | 8.5   | 7.8   | 7.4   | 7.4   | 21.5  | 16.2  | 15.9  | 12.0 | 10.9  | 9.5  | 9.2  | 8.8  |
| 13         | 8.5   | 7.8   | 7.4   | 7.4   | 22.2  | 16.2  | 15.2  | 12.0 | 10.9  | 9.5  | 9.2  | 8.8  |
| 14         | 8.5   | 7.8   | 7.4   | 7.4   | 21.5  | 16.2  | 15.2  | 12.0 | 10.9  | 9.5  | 9.2  | 8.8  |
| 15         | 8.5   | 7.8   | 7.4   | 14.5  | 21.5  | 15.9  | 15.2  | 12.0 | 10.9  | 9.5  | 9.2  | 8.8  |
| 16         | 8.5   | 7.8   | 7.8   | 17.0  | 21.2  | 23.0  | 15.2  | 12.0 | 10.9  | 9.5  | 9.2  | 8.8  |
| 17         | 8.5   | 7.8   | 7.8   | 18.4  | 21.2  | 23.7  | 14.8  | 13.1 | 10.9  | 9.5  | 9.2  | 8.8  |
| 18         | 8.5   | 7.8   | 7.8   | 20.5  | 20.8  | 23.3  | 14.8  | 13.1 | 10.9  | 9.5  | 9.2  | 8.8  |
| 19         | 8.5   | 7.8   | 7.8   | 22.2  | 20.8  | 22.2  | 14.5  | 13.1 | 9.9   | 9.5  | 9.2  | 8.8  |
| 20         | 8.5   | 7.8   | 7.8   | 23.3  | 20.8  | 21.5  | 14.5  | 12.7 | 9.9   | 9.5  | 9.2  | 8.8  |
| 21         | 8.5   | 7.8   | 7.8   | 21.2  | 20.8  | 21.2  | 13.8  | 12.0 | 9.9   | 9.5  | 9.2  | 8.8  |
| 22         | 8.5   | 7.8   | 7.8   | 20.8  | 20.1  | 20.8  | 13.8  | 12.0 | 9.9   | 9.5  | 9.2  | 8.8  |
| 23         | 8.5   | 7.8   | 7.8   | 24.0  | 20.1  | 20.1  | 13.8  | 11.7 | 9.9   | 9.5  | 9.2  | 8.8  |
| 24         | 8.1   | 7.8   | 7.8   | 26.1  | 19.8  | 20.1  | 13.4  | 11.3 | 9.9   | 9.5  | 9.2  | 8.8  |
| 25         | 8.1   | 7.8   | 7.8   | 26.1  | 19.1  | 20.1  | 13.4  | 10.9 | 9.9   | 9.5  | 9.2  | 8.8  |
| 26         | 8.1   | 7.8   | 7.8   | 25.4  | 19.1  | 20.1  | 13.4  | 10.9 | 9.9   | 9.5  | 9.2  | 8.8  |
| 27         | 8.1   | 7.8   | 7.8   | 24.4  | 19.1  | 19.8  | 13.4  | 10.9 | 9.9   | 9.5  | 9.2  | 8.8  |
| 28         | 8.1   | 7.8   | 7.4   | 24.4  | 19.1  | 19.4  | 13.4  | 10.9 | 9.9   | 9.5  | 9.2  | 8.8  |
| 29         | 8.1   | 7.4   | 7.4   | 24.4  | 19.1  | 19.1  | 13.4  | 10.9 | 9.2   | 9.5  | 8.8  | 8.5  |
| 30         | 8.1   | 7.4   | 7.4   | 24.4  | 18.7  | 18.7  | 13.4  | 10.9 | 9.2   | 9.5  | 8.8  | 8.5  |
| 31         | 8.1   | 7.4   | 7.4   | 18.7  |       |       | 13.1  | 10.9 |       | 9.2  |      | 8.5  |
| <b>Sum</b> | 221.1 | 460.7 | 570.8 |       | 373.1 | 292.3 | 271.9 |      |       |      |      |      |
|            | 260.3 | 235.8 | 663.6 | 468.9 | 310.4 | 275.2 |       |      |       |      |      |      |

## Current Year 1981

| Month         | Extreme Gage Feet |     |     | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet                  | Period #Dec. 1961-1981 |         |         |
|---------------|-------------------|-----|-----|--------------------------------|------|---------------------|----------------------------------|------------------------|---------|---------|
|               | High              | Low | Day | High                           | Low  |                     |                                  | Average                | Maximum | Minimum |
| Jan.          |                   |     |     | 8.5                            | 124  | 8.1                 | 516                              | 482                    | 934     | 4.4     |
| Feb.          |                   |     |     | 8.1                            | 110  | 7.8                 | 438                              | 428                    | 843     | 4.1     |
| Mar.          |                   |     |     | 7.8                            | 15   | 7.4                 | 467                              | 455                    | 923     | 4.9     |
| Apr.          |                   |     |     | 124                            | 26.1 | 1.1                 | 15.5                             | 914                    | 914     | 4.2     |
| May           |                   |     |     | 3                              | 25.4 | 130                 | 18.7                             | 1,317                  | 550     | 1,317   |
| June          |                   |     |     | 17                             | 23.7 | 15                  | 18.7                             | 1,133                  | 494     | 1,133   |
| July          |                   |     |     | 1.1                            | 18.0 | 31                  | 13.1                             | 930                    | 533     | 977     |
| Aug.          |                   |     |     | 1.1                            | 13.1 | 25                  | 10.9                             | 740                    | 569     | 1,216   |
| Sept.         |                   |     |     | 9                              | 11.3 | 129                 | 9.2                              | 616                    | 623     | 1,111   |
| Oct.          |                   |     |     | 1.6                            | 9.5  | 6                   | 8.8                              | 581                    | 675     | 1,420   |
| Nov.          |                   |     |     | 1.1                            | 9.2  | 129                 | 8.8                              | 545                    | 602     | 1,338   |
| Dec.          |                   |     |     | 1.1                            | 8.8  | 129                 | 8.5                              | 541                    | 525     | 1,187   |
|               |                   |     |     | 26.1                           |      | 7.4                 | 12.0                             | 8,738                  | 6,420   | 11,421  |
| <b>Yearly</b> | <b>Meters</b>     |     |     | <b>Cubic Meters per Second</b> |      |                     | <b>Thousands of Cubic Meters</b> |                        |         |         |
|               |                   |     |     | 0.74                           |      | 0.21                | 0.34                             | 10,777                 | 7,920   | 14,089  |

# Mean daily

# Some months missing

I And other days

## EIGHT MILE CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Concrete wall with 90° V-notch weir of 6.9 second-foot (0.2 m<sup>3</sup>/sec) capacity, bubbler gage, and water-stage recorder located on the left bank at latitude 29°24'00", longitude 101°00'55", 0.8 creek mile (1.3 km) from the confluence with the Rio Grande, and about 8 miles (12.9 km) northwest of Del Rio, Texas. This stream enters the Rio Grande from the United States side at river mile 569.3 (916.2 km), 4.6 river miles (7.4 km) downstream from Amistad Dam, and 8.3 river miles (13.4 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on a continuous record of gage heights and the weir discharge table. Records available: March 1961 through 1981.

**REMARKS:** The source of flow of this stream is from surface runoff during rainy periods and the subsequent flow from underground seepage as a result of such rains. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of this stream.

## EXTREME FLOWS FROM RECORDS:

|          | Average Flow in Second-Feet (Cubic Meters per Second) |                    |             |        |  |               |
|----------|---|--------------------|-------------|--------|--|---------------|
| Daily:   | Max. 15.9 (0.45)                                      | July 23 & 24, 1976 |             | Min. 0 |  | Occasionally  |
| Monthly: | Max. 6.3 (0.18)                                       | July               | 1976        | Min. 0 |  | Occasionally  |
| Yearly:  | Max. 4.0 (0.11)                                       |                    | 1974 & 1975 | Min. 0 |  | Several years |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan. | Feb. | March | April | May  | June | July | Aug. | Sept. | Oct. | Nov.  | Dec. |
|------------|------|------|-------|-------|------|------|------|------|-------|------|-------|------|
| 1          | 2.5  | 2.5  | 2.5   | 2.5   | 4.2  | 2.5  | 2.8  | 2.5  | 2.8   | 2.8  | 3.2   | 3.2  |
| 2          | 2.5  | 2.5  | 2.5   | 2.5   | 4.2  | 2.5  | 2.8  | 2.5  | 2.8   | 2.8  | 3.2   | 3.2  |
| 3          | 2.5  | 2.5  | 2.8   | 2.5   | 4.6  | 2.5  | 2.8  | 2.5  | 2.8   | 2.5  | 3.2   | 3.2  |
| 4          | 2.5  | 2.5  | 2.5   | 2.5   | 4.2  | 2.8  | 2.8  | 2.5  | 2.8   | 2.5  | 3.2   | 3.2  |
| 5          | 2.5  | 2.8  | 2.5   | 2.5   | 3.5  | 2.8  | 2.8  | 2.5  | 2.8   | 2.8  | 3.2   | 3.2  |
| 6          | 2.5  | 2.5  | 2.5   | 2.5   | 3.5  | 2.8  | 2.8  | 2.5  | 2.8   | 3.2  | 3.2   | 3.2  |
| 7          | 2.5  | 2.8  | 2.5   | 2.5   | 3.2  | 2.8  | 2.5  | 2.5  | 2.8   | 3.9  | 3.2   | 3.2  |
| 8          | 2.5  | 2.5  | 2.5   | 2.5   | 3.2  | 2.8  | 2.5  | 2.8  | 2.8   | 3.2  | 3.2   | 3.2  |
| 9          | 2.5  | 2.5  | 2.5   | 2.1   | 3.2  | 2.8  | 2.5  | 2.8  | 2.5   | 3.2  | 2.8   | 3.2  |
| 10         | 2.5  | 2.5  | 2.5   | 2.5   | 2.8  | 2.8  | 2.5  | 2.8  | 2.5   | 2.8  | 3.2   | 3.2  |
| 11         | 2.5  | 2.5  | 2.8   | 2.1   | 2.8  | 2.5  | 2.5  | 2.8  | 2.5   | 2.8  | 3.2   | 3.5  |
| 12         | 2.5  | 2.5  | 2.8   | 2.1   | 2.8  | 2.5  | 2.5  | 2.5  | 2.5   | 2.8  | 3.2   | 3.5  |
| 13         | 2.5  | 2.5  | 2.8   | 2.1   | 2.8  | 2.5  | 2.5  | 2.5  | 2.8   | 3.5  | 3.2   | 3.5  |
| 14         | 2.5  | 2.5  | 2.5   | 2.5   | 2.8  | 2.8  | 2.5  | 2.5  | 2.8   | 3.5  | 3.2   | 3.5  |
| 15         | 2.5  | 2.5  | 2.5   | 3.2   | 2.8  | 2.8  | 2.5  | 2.5  | 2.5   | 3.2  | 3.2   | 3.2  |
| 16         | 2.5  | 2.5  | 2.5   | 2.8   | 2.8  | 3.5  | 2.5  | 2.5  | 2.5   | 3.2  | 3.2   | 3.2  |
| 17         | 2.5  | 2.5  | 2.5   | 2.8   | 2.8  | 4.2  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 18         | 2.8  | 2.5  | 2.5   | 3.2   | 2.8  | 3.9  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 19         | 2.8  | 2.5  | 2.5   | 3.2   | 2.8  | 3.5  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 20         | 2.5  | 2.8  | 2.5   | 2.8   | 2.5  | 3.2  | 2.5  | 2.8  | 2.8   | 3.2  | 3.2   | 3.2  |
| 21         | 2.5  | 2.5  | 2.5   | 2.8   | 2.8  | 3.2  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 22         | 2.5  | 2.5  | 2.5   | 2.8   | 2.8  | 2.8  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 23         | 2.5  | 2.5  | 2.5   | 3.2   | 2.8  | 2.8  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 24         | 2.8  | 2.5  | 2.5   | 3.9   | 2.8  | 3.2  | 2.5  | 2.5  | 2.5   | 3.2  | 3.2   | 3.2  |
| 25         | 2.8  | 2.5  | 2.5   | 3.9   | 2.8  | 3.2  | 2.5  | 2.5  | 2.5   | 3.2  | 3.2   | 3.2  |
| 26         | 2.8  | 2.5  | 2.5   | 3.5   | 2.8  | 3.2  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.5  |
| 27         | 2.8  | 2.5  | 2.5   | 3.2   | 2.8  | 3.2  | 2.8  | 2.5  | 2.8   | 3.2  | 3.2   | 3.5  |
| 28         | 2.5  | 2.5  | 2.5   | 3.2   | 2.8  | 3.2  | 2.5  | 2.8  | 2.5   | 3.2  | 3.2   | 3.2  |
| 29         | 2.5  | 2.5  | 2.5   | 3.2   | 2.8  | 2.8  | 2.5  | 2.8  | 2.8   | 3.2  | 3.2   | 3.2  |
| 30         | 2.5  | 2.5  | 2.5   | 3.2   | 2.8  | 2.8  | 2.5  | 2.8  | 2.8   | 3.2  | 3.2   | 3.2  |
| 31         | 2.5  | 2.5  | 2.5   | 2.8   | 2.8  | 2.5  | 2.5  | 2.5  | 2.8   | 3.2  | 3.2   | 3.2  |
| <b>Sum</b> | 70.9 |      | 84.3  |       | 88.9 |      | 81.7 |      | 97.7  |      | 101.3 |      |
|            | 79.3 |      | 78.7  |       | 95.1 |      | 79.6 |      | 78.9  |      | 95.6  |      |

## Current Year 1981

## Period #March 1961-1981

| Month         | Extreme Gage ** Feet |      | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet | Acre-Feet                        |         |         |
|---------------|----------------------|------|--------------------------------|------|---------------------|-----------------|----------------------------------|---------|---------|
|               | High                 | Low  | Day                            | Day  |                     |                 | Average                          | Maximum | Minimum |
| Jan.          | 1.02                 | 0.98 | 117                            | 2.8  | 1 1                 | 2.5             | 156                              | 104     | 294     |
| Feb.          | 1.02                 | .95  | 20                             | 2.8  | 1 1                 | 2.5             | 139                              | 94.3    | 273     |
| Mar.          | 1.21                 | .95  | 1 3                            | 2.8  | 1 1                 | 2.5             | 155                              | 96.9    | 271     |
| Apr.          | 2.40                 | .95  | 124                            | 3.9  | 1 9                 | 2.1             | 167                              | 99.6    | 244     |
| May           | 1.28                 | .98  | 3                              | 4.6  | 118                 | 2.5             | 190                              | 99.3    | 224     |
| June          | 3.87                 | .95  | 17                             | 4.2  | 1 1                 | 2.5             | 177                              | 90.0    | 214     |
| July          | 1.61                 | .92  | 1 1                            | 2.8  | 122                 | 2.1             | 157                              | 97.4    | 390     |
| Aug.          | 2.10                 | .92  | 8                              | 3.2  | 1                   | 2.1             | 162                              | 102     | 299     |
| Sept.         | 1.08                 | .95  | 1 1                            | 2.8  | 1 3                 | 2.5             | 156                              | 92.1    | 240     |
| Oct.          | 3.74                 | 1.02 | 1 7                            | 3.9  | 1 1                 | 2.5             | 193                              | 111     | 334     |
| Nov.          | 1.15                 | 1.05 | 1 1                            | 3.2  | 9                   | 2.8             | 188                              | 102     | 321     |
| Dec.          | 1.15                 | 1.08 | 114                            | 3.5  | 1 2                 | 3.2             | 200                              | 107     | 283     |
|               | 3.87                 | 0.92 |                                | 4.6  | 2.1                 | 2.8             | 2,040                            | 1,195.6 | 2,892   |
| <b>Yearly</b> | <b>Meters</b>        |      | <b>Cubic Meters per Second</b> |      |                     |                 | <b>Thousands of Cubic Meters</b> |         |         |
|               | 1.18                 | 0.28 | 0.13                           | 0.06 | 0.08                | 2,518           | 1,473                            | 3,567   | 4.2     |

\*\* Includes storm runoff

# Some months missing

! And other days

Ø Mean daily

## MCKEE SPRING NEAR DEL RIO, TEXAS

**DESCRIPTION:** This spring is located on the left flood plain of the Rio Grande at latitude 29°23'35", longitude 101°01'15", about 150 feet (45.7 m) from the edge of the low-flow channel and about 8 miles (12.9 km) north-west of Del Rio, Texas. Water from this spring enters the Rio Grande at river mile 569.1 (915.9 km), 4.8 river miles (7.7 km) downstream from Amistad Dam. The zero of the gage is 894.59 feet above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 25 discharge measurements during the year. Mean daily discharges determined by prorating between measurements. Records available: November 1961 through 1981.

**REMARKS:** The flow of this spring is uniform during periods of dry weather and is not modified by diversions or storage. It is estimated that backwater from the Rio Grande will reach the emergence of this spring when the river flow is approximately 14,000 second-feet (396 m³/sec). This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of this spring. In April 1977 the water began to leak under the weir, causing the gage height-discharge relationship to become ineffective.

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second) |      |            |  |               |      |  |        |  |              |  |  |
|---|------|------------|--|---------------|------|--|--------|--|--------------|--|--|
| Daily:  | Max. | 9.6 (0.27) |  | Nov. 21, 1979 |      |  | Min. 0 |  | Occasionally |  |  |
| Monthly:  | Max. | 8.7 (0.25) |  | Nov.          | 1979 |  | Min. 0 |  | Occasionally |  |  |
| Yearly:   | Max. | 7.8 (0.22) |  |               | 1979 |  | Min. 0 |  | 1963         |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day   | Jan.  | Feb.  | March | April | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1     | 5.9   | 5.9   | 5.2   | * 5.4 | 5.4   | 5.6   | * 7.7 | 6.0   | 6.3   | * 6.1 | 5.8   | 7.1   |
| 2     | 6.0   | 5.9   | 5.2   | 5.4   | 5.4   | 5.7   | 7.6   | 6.0   | * 6.3 | 6.1   | 5.8   | 7.2   |
| 3     | 6.0   | 5.9   | 5.2   | 5.4   | 5.5   | *     | 5.7   | 7.6   | 5.9   | 6.3   | 6.1   | 5.7   |
| 4     | 6.1   | * 5.9 | * 5.2 | 5.4   | 5.5   | 5.8   | 7.5   | 5.9   | 6.3   | 6.1   | * 5.7 | 7.3   |
| 5     | 6.1   | 5.8   | 5.2   | 5.4   | 5.5   | 6.0   | 7.5   | * 5.8 | 6.3   | 6.1   | 5.7   | 7.4   |
| 6     | 6.2   | 5.8   | 5.2   | 5.4   | * 5.5 | 6.1   | 7.4   | 5.8   | 6.3   | 6.1   | 5.8   | 7.4   |
| 7     | * 6.2 | 5.8   | 5.2   | 5.4   | 5.5   | 6.3   | 7.4   | 5.8   | 6.3   | 6.1   | 5.8   | 7.5   |
| 8     | 6.2   | 5.7   | 5.2   | 5.5   | 5.4   | 6.4   | 7.3   | 5.8   | 6.3   | 6.0   | 5.8   | 7.5   |
| 9     | 6.2   | 5.6   | 5.2   | 5.5   | 5.4   | 6.6   | 7.3   | 5.8   | 6.3   | 6.0   | 5.9   | 7.6   |
| 10    | 6.2   | 5.6   | 5.2   | 5.5   | 5.4   | 6.7   | 7.2   | 5.8   | 6.2   | 6.0   | 5.9   | 7.7   |
| 11    | 6.2   | 5.6   | 5.2   | 5.5   | 5.4   | 6.8   | 7.2   | 5.8   | 6.2   | 6.0   | 6.0   | 7.7   |
| 12    | 6.2   | 5.5   | 5.2   | 5.5   | 5.3   | 7.0   | 7.1   | 5.8   | 6.2   | 6.0   | 6.0   | 7.8   |
| 13    | 6.2   | 5.4   | 5.2   | 5.5   | 5.3   | 7.1   | 7.0   | 5.9   | 6.2   | 6.0   | 6.0   | 7.8   |
| 14    | 6.1   | 5.4   | 5.2   | 5.5   | 5.3   | 7.3   | 7.0   | 5.9   | 6.2   | 6.0   | 6.1   | 7.9   |
| 15    | 6.1   | 5.4   | 5.2   | * 5.5 | 5.2   | 7.4   | * 6.9 | 5.9   | 6.2   | 6.0   | 6.1   | 7.9   |
| 16    | 6.1   | 5.3   | 5.2   | 5.5   | 5.2   | *     | 7.6   | 6.9   | 5.9   | 6.2   | 6.0   | 6.1   |
| 17    | 6.1   | 5.2   | 5.2   | 5.5   | 5.2   | *     | 7.7   | 6.8   | 5.9   | 6.2   | 6.0   | 6.0   |
| 18    | 6.1   | * 5.2 | * 5.2 | 5.5   | 5.2   | 7.7   | 6.8   | 5.9   | 6.2   | 6.0   | 6.2   | 8.0   |
| 19    | 6.1   | 5.2   | 5.2   | 5.5   | 5.1   | 7.7   | 6.7   | * 5.9 | 6.2   | 6.0   | 6.3   | 8.0   |
| 20    | 6.1   | 5.2   | 5.2   | 5.5   | *     | 5.1   | 7.7   | 6.7   | 5.9   | 6.2   | 6.0   | 6.3   |
| 21    | * 6.1 | 5.2   | 5.2   | 5.5   | 5.1   | 7.7   | 6.6   | 6.0   | 6.2   | 6.0   | 6.4   | 7.9   |
| 22    | 6.1   | 5.2   | 5.2   | 5.4   | 5.2   | 7.7   | 6.6   | 6.0   | 6.2   | 6.0   | 6.2   | 8.0   |
| 23    | 6.1   | 5.2   | 5.3   | 5.4   | 5.2   | 7.7   | 6.5   | 6.0   | 6.2   | 6.0   | 6.2   | 8.0   |
| 24    | 6.1   | 5.2   | 5.3   | 5.4   | 5.3   | 7.7   | 6.5   | 6.0   | 6.1   | 5.9   | 6.6   | 7.9   |
| 25    | 6.0   | 5.2   | 5.3   | 5.4   | 5.3   | 7.7   | 6.4   | 6.1   | 6.1   | 5.9   | 6.7   | 7.9   |
| 26    | 6.0   | 5.2   | 5.3   | 5.4   | 5.4   | 7.7   | 6.3   | 6.1   | 6.1   | 5.9   | 6.8   | 7.9   |
| 27    | 6.0   | 5.2   | 5.3   | 5.4   | 5.4   | 7.7   | 6.2   | 6.2   | 6.1   | * 5.9 | 6.9   | 7.8   |
| 28    | 6.0   | 5.2   | 5.3   | 5.4   | 5.4   | 7.7   | 6.2   | 6.2   | 6.1   | 5.9   | 7.0   | 7.8   |
| 29    | 6.0   |       |       | 5.4   | *     | 5.5   | 7.7   | 6.2   | 6.1   | 5.9   | 7.1   | *     |
| 30    | 6.0   |       |       | 5.4   | 5.4   | 5.5   | 7.7   | 6.1   | 6.2   | 6.1   | 5.8   | 7.8   |
| 31    | 6.0   |       |       | 5.4   |       | 5.6   | 6.1   | 6.2   |       | 5.8   |       |       |
| Sum   |       | 152.9 |       | 163.4 |       | 211.9 |       | 184.5 |       | 185.5 |       | 239.4 |
| 188.8 |       | 162.5 |       | 165.7 |       | 213.4 |       | 186.2 |       | 186.6 |       |       |

Current Year 1981

| Month  | Extreme Gage Feet |     |     | Extreme Second-Feet     |      | Average Second-Feet | Total Acre-Feet           | Acre-Feet |         |         |     |  |
|--------|-------------------|-----|-----|-------------------------|------|---------------------|---------------------------|-----------|---------|---------|-----|--|
|        | High              |     | Day | High                    |      |                     |                           | Average   | Maximum | Minimum |     |  |
|        | High              | Low |     | Day                     | High |                     |                           |           |         |         |     |  |
| Jan.   | 6                 | 6.2 | 1   | 1                       | 5.9  | 6.1                 | 374                       | 281       | 526     | 0       |     |  |
| Feb.   | 1                 | 5.9 | 117 | 5.2                     | 5.5  | 5.5                 | 303                       | 254       | 461     | 0       |     |  |
| Mar.   | 129               | 5.4 | 1   | 1                       | 5.2  | 5.2                 | 322                       | 278       | 527     | 0       |     |  |
| Apr.   | 8                 | 5.5 | 1   | 1                       | 5.4  | 5.4                 | 324                       | 276       | 490     | 0       |     |  |
| May    | 31                | 5.6 | 119 | 5.1                     | 5.3  | 5.3                 | 329                       | 302       | 480     | .7      |     |  |
| June   | 117               | 7.7 | 1   | 5.6                     | 7.1  | 7.1                 | 420                       | 276       | 441     | 0       |     |  |
| July   | 1                 | 7.7 | 130 | 6.1                     | 6.9  | 6.9                 | 423                       | 282       | 474     | 0       |     |  |
| Aug.   | 128               | 6.2 | 15  | 5.8                     | 6.0  | 6.0                 | 366                       | 286       | 488     | 0       |     |  |
| Sept.  | 1                 | 6.3 | 124 | 6.1                     | 6.2  | 6.2                 | 369                       | 285       | 479     | 0       |     |  |
| Oct.   | 1                 | 6.1 | 130 | 5.8                     | 6.0  | 6.0                 | 368                       | 297       | 519     | 0       |     |  |
| Nov.   | 30                | 7.1 | 13  | 5.7                     | 6.2  | 6.2                 | 370                       | 284       | 516     | 0       |     |  |
| Dec.   | 116               | 8.0 | 1   | 7.1                     | 7.7  | 7.7                 | 475                       | 290       | 483     | 0       |     |  |
|        |                   |     |     | 8.0                     | 5.1  | 6.1                 | 4,443                     | 3,391     | 5,657   | 0.7     |     |  |
| Yearly | Meters            |     |     | Cubic Meters per Second |      |                     | Thousands of Cubic Meters |           |         |         |     |  |
|        |                   |     |     | 0.23                    |      | 0.14                | 0.17                      | 5,484     | 4,183   | 6,978   | 0.9 |  |

\* Discharge measurement made on this day

0 Mean daily

1 And other days

## CANTU SPRING NEAR DEL RIO, TEXAS

**DESCRIPTION:** Concrete enclosure located at the spring source in the channel of a small tributary to Cienegas Creek at latitude 29° 23' 15", longitude 100° 56' 00", about 2.5 miles (4.0 km) northwest of Del Rio, Texas and 3.5 creek miles (5.6 km) from the confluence with the Rio Grande. Cienegas Creek enters the Rio Grande at river mile 562.9 (905.8 km), 1.8 river miles (3.0 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on 52 discharge measurements during the year. Mean daily discharges determined by prorating between measurements. Records available: March 1961 through 1981.

**REMARKS:** The flow of this spring is very uniform and is not modified by diversions or storage. A weir was installed on May 24, 1961 and removed November 21, 1962. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of this spring.

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second) |      |      |        |                    |  |      |        |  |              |  |  |
|---|------|------|--------|--------------------|--|------|--------|--|--------------|--|--|
| Daily:  | Max. | 10.0 | (0.28) | July 27 & 28, 1976 |  |      | Min. 0 |  | Occasionally |  |  |
| Monthly:  | Max. | 8.9  | (0.25) | December 1976      |  |      | Min. 0 |  | Occasionally |  |  |
| Yearly:   | Max. | 8.2  | (0.23) |                    |  | 1977 | Min. 0 |  | 1963         |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.  | Feb.  | March | April | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1          | 4.8   | 4.6   | 5.3   | * 4.7 | 6.1   | 5.8   | * 7.1 | 6.9   | * 7.1 | 8.1   | 8.8   | 7.6   |
| 2          | 4.9   | 4.5   | 5.3   | 4.7   | 6.2   | 5.7   | 7.1   | 6.9   | * 7.2 | 8.2   | 8.7   | * 7.6 |
| 3          | 4.9   | 4.4   | 5.3   | 4.6   | 6.4   | * 5.7 | 7.0   | 6.9   | 7.1   | 8.4   | 8.7   | 7.7   |
| 4          | 5.0   | * 4.3 | * 5.3 | 4.6   | 6.5   | 5.9   | 7.0   | 6.8   | 7.0   | 8.6   | * 8.6 | 7.8   |
| 5          | 5.0   | 4.4   | 5.3   | 4.6   | 6.7   | 6.1   | 6.9   | * 6.8 | 6.9   | 8.8   | 8.5   | 7.9   |
| 6          | 5.1   | 4.4   | 5.3   | 4.6   | * 6.8 | 6.3   | 6.9   | 6.9   | 6.7   | 8.9   | 8.4   | 8.0   |
| 7          | * 5.1 | 4.5   | 5.3   | 4.5   | 6.7   | 6.4   | 6.8   | 6.9   | 6.6   | * 9.1 | 8.4   | 8.1   |
| 8          | 5.1   | 4.5   | 5.3   | * 4.5 | 6.6   | 6.6   | * 6.8 | 7.0   | 6.5   | 9.1   | 8.3   | 8.2   |
| 9          | 5.1   | 4.6   | 5.3   | 4.5   | 6.5   | 6.8   | 6.8   | 7.0   | * 6.4 | 9.2   | 8.2   | * 8.3 |
| 10         | 5.1   | 4.6   | 5.3   | 4.5   | 6.5   | * 7.0 | 6.9   | 7.1   | 6.5   | 9.2   | 8.2   | 8.3   |
| 11         | 5.0   | * 4.7 | * 5.3 | 4.5   | 6.4   | 7.1   | 6.9   | 7.1   | 6.5   | 9.2   | * 8.1 | 8.3   |
| 12         | 5.0   | 4.7   | 5.2   | 4.5   | 6.3   | 7.3   | 6.9   | * 7.2 | 6.6   | 9.2   | * 8.0 | 8.3   |
| 13         | 5.0   | 4.7   | 5.2   | 4.5   | * 6.2 | 7.4   | 6.9   | 7.1   | 6.7   | 9.2   | 8.1   | 8.4   |
| 14         | * 5.0 | 4.7   | 5.1   | 4.5   | 6.0   | 7.6   | 7.0   | 7.1   | 6.8   | 9.3   | 8.2   | 8.4   |
| 15         | 5.0   | 4.7   | 5.1   | * 4.5 | 5.8   | 7.7   | * 7.0 | 7.0   | 6.8   | * 9.3 | 8.2   | 8.4   |
| 16         | 4.9   | 4.7   | 5.0   | 4.5   | 5.6   | 7.9   | 7.0   | 7.0   | * 6.9 | 9.2   | 8.3   | * 8.4 |
| 17         | 4.9   | 4.7   | 5.0   | 4.6   | 5.5   | * 8.0 | 7.0   | 6.9   | 6.9   | 9.0   | 8.4   | 8.5   |
| 18         | 4.9   | * 4.7 | * 4.9 | 4.6   | 5.3   | 7.8   | 7.0   | 6.9   | 7.0   | 8.8   | * 8.5 | 8.6   |
| 19         | 4.9   | 4.8   | 4.9   | 4.6   | 5.1   | 7.7   | 7.0   | * 6.8 | 7.0   | 8.7   | 8.4   | 8.7   |
| 20         | 4.8   | 4.9   | 5.0   | 4.6   | * 4.9 | 7.5   | 7.0   | 6.8   | 7.0   | 8.6   | 8.2   | 8.8   |
| 21         | * 4.8 | 5.0   | 5.0   | 4.7   | 5.1   | 7.3   | 7.0   | 6.8   | 7.0   | * 8.4 | 8.1   | 8.9   |
| 22         | 4.8   | 5.0   | 5.0   | * 4.7 | 5.2   | 7.1   | * 7.0 | 6.8   | 7.1   | 8.5   | 8.0   | 9.0   |
| 23         | 4.8   | 5.1   | 5.0   | 4.9   | 5.4   | 7.0   | 7.0   | 6.7   | * 7.1 | 8.6   | 7.9   | * 9.1 |
| 24         | 4.8   | 5.2   | 5.1   | 5.0   | 5.5   | * 6.8 | 7.0   | 6.7   | 7.2   | 8.7   | 7.7   | 9.1   |
| 25         | 4.9   | * 5.3 | * 5.1 | 5.2   | 5.7   | 6.8   | 7.0   | 6.7   | 7.3   | 8.7   | * 7.6 | 9.2   |
| 26         | 4.9   | 5.3   | 5.0   | 5.3   | * 5.8 | 6.9   | 7.0   | * 6.7 | 7.4   | 8.8   | 7.6   | 9.2   |
| 27         | * 4.9 | 5.3   | 5.0   | 5.5   | * 6.0 | 6.9   | 7.0   | 6.8   | 7.6   | 8.9   | 7.6   | 9.2   |
| 28         | * 4.9 | 5.3   | 4.9   | 5.6   | 6.0   | 7.0   | 7.0   | 6.8   | 7.7   | * 9.0 | 7.6   | 9.2   |
| 29         | 4.8   | 4.9   | * 5.8 | 5.9   | 5.9   | 7.0   | * 7.0 | 6.9   | 7.8   | 8.9   | 7.6   | 9.3   |
| 30         | 4.7   | 4.8   | 5.9   | 5.9   | 5.9   | 7.1   | 7.0   | 7.0   | * 7.9 | 8.9   | 7.6   | * 9.3 |
| 31         | 4.6   | 4.8   | 5.0   | 5.8   | 5.8   | 6.9   | 7.1   | 6.9   | 7.1   | 8.8   | 8.8   | 9.3   |
| <b>Sum</b> |       | 133.6 |       | 143.8 |       | 208.2 |       | 214.1 |       | 274.3 |       | 265.1 |
|            |       | 152.4 |       | 158.3 |       | 184.4 |       | 215.9 |       | 210.3 |       | 244.5 |

| Current Year 1981 |                   |     |                         |      |                     |                 |                           |       |       |      |     | Period March 1961-1981 |         |         |
|-------------------|-------------------|-----|-------------------------|------|---------------------|-----------------|---------------------------|-------|-------|------|-----|------------------------|---------|---------|
| Month             | Extreme Gage Feet |     | Ø Extreme Second-Feet   |      | Average Second-Feet | Total Acre-Feet | Acre-Feet                 |       |       |      |     |                        |         |         |
|                   | High              | Low | Day                     | Day  |                     |                 | High                      | Low   | Day   | High | Low | Average                | Maximum | Minimum |
| Jan.              | ! 6               | 5.1 | 31                      | 4.6  | 4.9                 | 302             | 287                       | 525   | 0     |      |     |                        |         |         |
| Feb.              | ! 25              | 5.3 | 4                       | 4.3  | 4.8                 | 265             | 259                       | 474   | 0     |      |     |                        |         |         |
| Mar.              | ! 1               | 5.3 | 130                     | 4.8  | 5.1                 | 314             | 274                       | 518   | 0     |      |     |                        |         |         |
| Apr.              | 30                | 5.9 | 7                       | 4.5  | 4.8                 | 285             | 258                       | 480   | 0     |      |     |                        |         |         |
| May               | 6                 | 6.8 | 20                      | 4.9  | 5.9                 | 366             | 260                       | 508   | 0     |      |     |                        |         |         |
| June              | 17                | 8.0 | ! 2                     | 5.7  | 6.9                 | 413             | 245                       | 531   | 0     |      |     |                        |         |         |
| July              | ! 1               | 7.1 | ! 7                     | 6.8  | 7.0                 | 428             | 253                       | 505   | 0     |      |     |                        |         |         |
| Aug.              | 12                | 7.2 | ! 23                    | 6.7  | 6.9                 | 425             | 260                       | 526   | 0     |      |     |                        |         |         |
| Sept.             | 30                | 7.9 | 9                       | 6.4  | 7.0                 | 417             | 257                       | 520   | 0     |      |     |                        |         |         |
| Oct.              | ! 14              | 9.3 | 1                       | 8.1  | 8.8                 | 544             | 295                       | 514   | 0     |      |     |                        |         |         |
| Nov.              | 1                 | 8.8 | ! 25                    | 7.6  | 8.2                 | 485             | 286                       | 521   | 0     |      |     |                        |         |         |
| Dec.              | ! 29              | 9.3 | ! 1                     | 7.6  | 8.6                 | 526             | 298                       | 544   | 0     |      |     |                        |         |         |
|                   |                   |     | 9.3                     | 4.3  | 6.6                 | 4,770           | 3,242                     | 5,918 | 0     |      |     |                        |         |         |
| Yearly            | Meters            |     | Cubic Meters per Second |      |                     |                 | Thousands of Cubic Meters |       |       |      |     |                        |         |         |
|                   |                   |     | 0.26                    | 0.12 | 0.19                |                 | 5,883                     | 3,999 | 7,300 |      |     |                        |         |         |

\* Discharge measurement made on this day      Ø Mean daily      ! And other days

## CIENEGAS CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Gravity wells and water-stage recorders located, one each, on the left bank of the Cienegas Creek at latitude 29°21'00", longitude 100°56'40", 0.3 creek mile (0.5 km) from the confluence with the Rio Grande, and for the Briggs Farm ditch, on the right bank of a concrete flume at latitude 29°21'40", longitude 100°56'30", 2,900 feet (884 m) from the ditch intake which branches off the right bank of Cienegas Creek immediately upstream from a small diversion dam across the creek, and about 2.5 miles (4.0 km) west of Del Rio, Texas. The point of diversion is 1.8 creek miles (2.9 km) from the confluence with the Rio Grande. Cienegas Creek enters the Rio Grande at river mile 562.9 (905.8 km), 1.8 river miles (3.0 km) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gages has not been determined.

**RECORDS:** Based on 52 discharge measurements each at Cienegas Creek and Briggs Farm Ditch during the year and a continuous record of gage heights. Mean daily discharge computations determined by combining the two records for the total yield of the springs. Records available: March 1965 through 1981. Discharge measurement data available since November 1962. Records are also available from September 1931 through June 1935 for a station 0.1 creek mile (0.2 km) downstream.

**REMARKS:** Low flow of this stream is from springs, one of which is Canto Spring whose discharge is shown on page 40. The flow of this stream is modified by irrigation diversions through the Briggs Farm ditch. During 1981 there were no appreciable diversions from the creek, other than through the Briggs Farm ditch, whose net amount of diversion is included in the tabulation below. All storm flow passing this station is deducted and is not included in the tabulation. These stations were established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of these springs.

**EXTREME FLOWS FROM RECORDS:**

## Average Flow in Second-Feet (Cubic Meters per Second)

|                           |                 |                 |                |
|---------------------------|-----------------|-----------------|----------------|
| Daily: Max. 42.7 (1.21)   | August 12, 1972 | Min. 0.5 (0.01) | April 21, 1966 |
| Monthly: Max. 24.8 (0.70) | July 1976       | Min. 0.8 (0.02) | August 1967    |
| Yearly: Max. 17.9 (0.51)  | 1977            | Min. 2.2 (0.06) | 1968           |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.         | Feb. | March        | April | May          | June | July         | Aug. | Sept.        | Oct. | Nov.         | Dec. |
|------------|--------------|------|--------------|-------|--------------|------|--------------|------|--------------|------|--------------|------|
| 1          | 12.4         | 10.6 | 13.4         | 10.9  | 18.4         | 12.4 | 16.2         | 10.9 | 11.3         | 9.9  | 15.2         | 13.1 |
| 2          | 11.3         | 11.3 | 13.4         | 10.9  | 18.0         | 12.4 | 16.2         | 11.7 | 10.9         | 10.9 | 14.8         | 13.8 |
| 3          | 11.7         | 12.0 | 13.4         | 11.7  | 18.0         | 11.3 | 14.5         | 11.3 | 12.0         | 10.2 | 14.8         | 13.1 |
| 4          | 11.3         | 12.4 | 12.7         | 10.2  | 17.7         | 12.7 | 14.5         | 11.3 | 12.0         | 10.2 | 14.5         | 13.8 |
| 5          | 12.4         | 12.7 | 13.1         | 9.9   | 16.2         | 12.7 | 14.5         | 12.0 | 11.7         | 10.2 | 15.9         | 14.5 |
| 6          | 11.7         | 12.4 | 12.7         | 9.9   | 14.8         | 12.7 | 14.1         | 12.0 | 11.3         | 16.2 | 19.4         | 16.2 |
| 7          | 12.7         | 11.7 | 13.1         | 9.5   | 14.5         | 12.7 | 14.1         | 12.0 | 11.3         | 25.1 | 15.2         | 16.6 |
| 8          | 12.7         | 12.4 | 12.0         | 9.2   | 14.5         | 11.3 | 14.5         | 14.1 | 11.7         | 19.8 | 15.5         | 17.3 |
| 9          | 12.7         | 12.7 | 11.7         | 9.2   | 14.5         | 11.7 | 13.8         | 13.4 | 11.7         | 15.9 | 15.5         | 17.7 |
| 10         | 12.7         | 11.7 | 10.6         | 9.5   | 13.4         | 11.7 | 14.5         | 13.1 | 11.7         | 15.5 | 15.9         | 15.9 |
| 11         | 12.0         | 12.4 | 11.3         | 9.5   | 13.4         | 13.1 | 14.1         | 12.7 | 10.9         | 15.9 | 14.8         | 15.9 |
| 12         | 11.7         | 12.4 | 12.4         | 9.9   | 13.1         | 13.8 | 12.7         | 12.4 | 10.9         | 15.5 | 15.9         | 17.3 |
| 13         | 11.7         | 12.7 | 11.7         | 10.6  | 11.7         | 14.5 | 12.7         | 11.3 | 12.4         | 18.4 | 15.9         | 17.3 |
| 14         | 11.3         | 12.7 | 10.9         | 11.7  | 11.7         | 15.2 | 13.4         | 11.3 | 12.4         | 18.4 | 14.8         | 17.0 |
| 15         | 11.7         | 13.4 | 11.3         | 14.8  | 11.7         | 15.2 | 13.4         | 11.7 | 13.1         | 18.0 | 15.9         | 17.0 |
| 16         | 12.4         | 13.4 | 10.9         | 13.8  | 11.7         | 20.1 | 11.7         | 11.7 | 12.7         | 16.2 | 15.2         | 16.2 |
| 17         | 12.4         | 12.7 | 11.3         | 14.1  | 11.7         | 21.9 | 12.0         | 11.7 | 12.4         | 15.9 | 14.8         | 16.6 |
| 18         | 13.8         | 12.7 | 11.7         | 15.2  | 11.7         | 22.6 | 12.0         | 13.4 | 12.0         | 15.5 | 14.8         | 16.6 |
| 19         | 13.8         | 13.1 | 10.9         | 14.5  | 11.7         | 19.4 | 10.9         | 12.4 | 11.3         | 16.2 | 14.5         | 17.0 |
| 20         | 14.1         | 11.7 | 12.0         | 14.8  | 10.6         | 19.1 | 10.9         | 12.0 | 11.3         | 16.2 | 14.5         | 16.2 |
| 21         | 12.7         | 11.7 | 12.0         | 14.8  | 11.3         | 17.7 | 11.3         | 11.7 | 10.6         | 16.2 | 14.1         | 16.2 |
| 22         | 13.1         | 12.0 | 11.3         | 15.2  | 10.9         | 17.7 | 10.9         | 11.7 | 9.9          | 17.3 | 13.8         | 16.2 |
| 23         | 12.7         | 12.4 | 10.9         | 22.2  | 10.6         | 15.5 | 10.9         | 11.7 | 9.2          | 17.7 | 13.4         | 15.5 |
| 24         | 13.1         | 12.0 | 11.3         | 26.5  | 11.3         | 15.5 | 12.0         | 11.7 | 9.2          | 17.7 | 13.4         | 14.5 |
| 25         | 13.1         | 11.3 | 10.9         | 23.7  | 12.0         | 14.5 | 12.0         | 11.7 | 9.5          | 17.3 | 13.4         | 15.5 |
| 26         | 12.4         | 12.4 | 10.9         | 18.7  | 12.0         | 15.9 | 10.9         | 11.7 | 10.2         | 15.9 | 13.4         | 15.5 |
| 27         | 12.0         | 12.7 | 10.9         | 17.7  | 11.3         | 15.5 | 11.3         | 11.3 | 10.2         | 15.5 | 13.1         | 16.6 |
| 28         | 12.0         | 12.7 | 10.6         | 16.6  | 11.7         | 16.6 | 12.4         | 10.6 | 10.6         | 15.5 | 14.5         | 15.5 |
| 29         | 11.3         |      | 11.3         | 17.3  | 11.7         | 15.9 | 12.4         | 11.3 | 9.9          | 15.2 | 13.8         | 15.5 |
| 30         | 10.2         |      | 11.3         | 17.7  | 12.4         | 16.2 | 12.4         | 10.9 | 9.9          | 15.2 | 13.1         | 16.2 |
| 31         | 10.6         |      | 10.2         |       | 12.0         |      | 11.3         | 11.3 |              | 15.2 |              | 16.2 |
| <b>Sum</b> | <b>344.3</b> |      | <b>420.2</b> |       | <b>457.5</b> |      | <b>368.0</b> |      | <b>492.0</b> |      | <b>492.5</b> |      |
|            | 379.7        |      | 362.1        |       | 406.2        |      | 398.5        |      | 334.2        |      | 440.6        |      |

| Current Year 1981 |                   |                  |                         |      |                     |                 |                           |         |         | Period March 1965-1981 |         |         |
|-------------------|-------------------|------------------|-------------------------|------|---------------------|-----------------|---------------------------|---------|---------|------------------------|---------|---------|
| Month             | Extreme Gage Feet |                  | Extreme Second-Feet     |      | Average Second-Feet | Total Acre-Feet | Acre-Feet                 |         |         | Average                | Maximum | Minimum |
|                   | High              | Low              | Day                     | Day  |                     |                 | High                      | Maximum | Minimum |                        |         |         |
| Jan.              |                   |                  | 20                      | 14.1 | 30                  | 10.2            | 12.4                      | 752     | 770     | 1,242                  | 134     |         |
| Feb.              |                   |                  | 115                     | 13.4 | 1                   | 10.6            | 12.4                      | 682     | 725     | 1,157                  | 98.0    |         |
| Mar.              |                   |                  | 11                      | 13.4 | 31                  | 10.2            | 11.7                      | 718     | 743     | 1,185                  | 102     |         |
| Apr.              |                   |                  | 24                      | 26.5 | 8                   | 9.2             | 14.1                      | 834     | 698     | 1,125                  | 100     |         |
| May               |                   |                  | 1                       | 18.4 | 120                 | 10.6            | 13.1                      | 805     | 688     | 1,159                  | 109     |         |
| June              |                   |                  | 18                      | 22.6 | 13                  | 11.3            | 15.2                      | 907     | 618     | 1,070                  | 86.3    |         |
| July              |                   |                  | 11                      | 16.2 | 119                 | 10.9            | 12.7                      | 788     | 639     | 1,527                  | 85.5    |         |
| Aug.              |                   |                  | 8                       | 14.1 | 28                  | 10.6            | 12.0                      | 729     | 654     | 1,241                  | 48.4    |         |
| Sept.             |                   |                  | 15                      | 13.1 | 123                 | 9.2             | 11.3                      | 663     | 641     | 1,043                  | 84.1    |         |
| Oct.              |                   |                  | 7                       | 25.1 | 1                   | 9.9             | 15.9                      | 976     | 753     | 1,135                  | 150     |         |
| Nov.              |                   |                  | 6                       | 16.2 | 127                 | 13.1            | 14.8                      | 874     | 746     | 1,117                  | 152     |         |
| Dec.              |                   |                  | 9                       | 17.7 | 1                   | 13.1            | 15.9                      | 977     | 780     | 1,168                  | 133     |         |
| Yearly            |                   |                  | 26.5                    |      | 9.2                 |                 | 13.4                      |         | 9,705   |                        | 8,455   |         |
|                   | Meters            |                  | Cubic Meters per Second |      |                     |                 | Thousands of Cubic Meters |         |         |                        |         |         |
|                   |                   |                  | 0.75                    |      | 0.26                |                 | 0.38                      |         | 11,971  |                        | 10,429  |         |
| Mean daily        |                   | 1 And other days |                         |      |                     |                 |                           | 15,992  |         | 1,888                  |         |         |

**RIO GRANDE AT DEL RIO, TEXAS AND CD. ACUNA, COAHUILA**

**DESCRIPTION:** Cableway, gravity well, concrete control weir, water-stage recorders (graphic and digital) and binary decimal transmitter located on the right bank at latitude 29°19'40", longitude 100°55'50", and river mile 561.2 (903.2 km), 1,200 feet (366 m) upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila and 12.7 river miles (20.4 km) downstream from Amistad Dam. The zero of the gage is 869.20 feet (264.93 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 24 discharge measurements during the year, 13 by the United States Section and 11 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: December 1923 through July 2, 1941 and January 1968 through 1981. Records are available from May 1900 through April 1915 for a station 12.2 miles (19.6 km) upstream; for December 1919 through March 1920 for a station 8.7 miles (14.0 km) upstream near McKee's Switch; from July 2, 1941 through 1954 and October 1960 through 1967 for a station 1,200 feet (366 m) downstream at the international highway bridge; and from September 1954 through 1981 for a station, Rio Grande below Amistad Dam, 10.6 miles (17.0 km) upstream.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Except for tributary inflows and small intervening diversions below Amistad Dam, flow at this station, after May 31, 1968 is controlled largely by releases from Amistad Reservoir. The transmitter, operated in cooperation with the National Weather Service, relays gage height data upon interrogation by telephone via commercial circuits.

**EXTREME FLOWS FROM RECORDS:** The greatest recorded flow of 1,140,000 second-feet (32,300 m<sup>3</sup>/sec) occurred on June 28, 1954, with a gage height of 38.25 feet (11.66 m) at a station 1,200 feet (366 m) downstream. The lowest recorded flow was 124 second-feet (3.51 m<sup>3</sup>/sec) which occurred March 5 and 6, 1969, with a gage height of 1.24 feet (0.38 m).

**Average Flow in Second-Feet (Cubic Meters per Second)\***

|          |                     |                |                 |               |
|----------|---------------------|----------------|-----------------|---------------|
| Daily:   | Max. 63,800 (1,810) | Sept. 22, 1974 | Min. 164 (4.64) | Aug. 13, 1971 |
| Monthly: | Max. 22,300 (632)   | Sept. 1974     | Min. 188 (5.32) | October 1971  |
| Yearly:  | Max. 5,170 (146)    | 1974           | Min. 701 (19.9) | 1972          |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.   | Feb.   | March  | April  | May    | June    | July   | Aug.   | Sept.  | Oct.    | Nov.   | Dec.   |
|------------|--------|--------|--------|--------|--------|---------|--------|--------|--------|---------|--------|--------|
| 1          | 2,110  | 2,020  | 1,830  | 2,020  | 1,110  | 869     | 3,200  | 1,010  | 1,780  | 1,360*  | 2,010  | 2,310  |
| 2          | 2,110  | 2,020  | 1,830  | 2,520* | 1,180  | 869     | 3,200* | 1,010  | 1,680  | 1,310   | 2,010  | 1,920  |
| 3          | 2,110  | 2,020  | 1,830  | 2,520  | 1,140  | 858     | 3,190  | 1,010  | 5,050* | 1,310   | 2,010  | 1,920  |
| 4          | 2,110  | 2,020  | 1,830  | 2,520  | 1,060  | 968*    | 3,190  | 1,010  | 4,340  | 1,310   | 2,010  | 1,920  |
| 5          | 2,110  | 2,020  | 1,830* | 2,520  | 946    | 2,870   | 3,200  | 749    | 3,710  | 1,310   | 2,060* | 1,920  |
| 6          | 2,110  | 2,020* | 1,830  | 2,520  | 946    | 2,210   | 3,200  | 1,390* | 5,370  | 2,810   | 2,110  | 1,920  |
| 7          | 2,110  | 2,020  | 1,830  | 2,480  | 946*   | 2,210   | 3,200  | 1,530  | 5,370  | 1,510   | 2,110  | 1,920  |
| 8          | 2,110* | 2,020  | 1,830  | 2,420  | 879    | 2,190   | 3,200  | 1,840  | 4,340  | 1,700*  | 2,110  | 1,920  |
| 9          | 2,110  | 2,020  | 1,830  | 2,420  | 879    | 2,210   | 3,010  | 1,810  | 3,200  | 1,730   | 2,110  | 1,920  |
| 10         | 2,110  | 2,020  | 1,830  | 2,410  | 879    | 2,210   | 2,520  | 1,830  | 4,270  | 1,730   | 2,110  | 1,920  |
| 11         | 2,110  | 2,020  | 1,830  | 2,420  | 879    | 2,340   | 2,520  | 1,790  | 4,450* | 3,810   | 2,110  | 1,920* |
| 12         | 2,210  | 2,020  | 1,830  | 2,420  | 879    | 2,630   | 2,520  | 1,780  | 4,480  | 12,900  | 2,110  | 1,920  |
| 13         | 2,210  | 2,020  | 1,830  | 2,420  | 879    | 2,630   | 2,520  | 1,730  | 4,480  | 13,200  | 2,110  | 1,920  |
| 14         | 2,210  | 1,920  | 1,830  | 2,600  | 879    | 2,630   | 2,520  | 1,920  | 6,180  | 13,100  | 2,110  | 1,920  |
| 15         | 2,110  | 1,920  | 1,830  | 3,130  | 890    | 2,700   | 1,660* | 2,260  | 8,400  | 13,000* | 2,110  | 1,920  |
| 16         | 1,840  | 1,920  | 1,830  | 3,810  | 1,460  | 4,200   | 2,430  | 2,260  | 8,400  | 10,800  | 2,110  | 2,020  |
| 17         | 1,480  | 1,920  | 1,830  | 4,380  | 1,480  | 3,280   | 2,420  | 2,840  | 8,440  | 6,960   | 2,110  | 2,020  |
| 18         | 1,710  | 1,920  | 1,830  | 4,410  | 1,310  | 3,200   | 2,420  | 4,980  | 8,330  | 6,960   | 2,110  | 2,020  |
| 19         | 2,020  | 1,830* | 1,830  | 3,960  | 858    | 3,200   | 2,430  | 6,820  | 8,400  | 7,100   | 2,110  | 2,020  |
| 20         | 2,020  | 1,830  | 1,830  | 3,960  | 816    | 3,200   | 2,520  | 6,820  | 8,400  | 7,660   | 2,110  | 2,020  |
| 21         | 2,020  | 1,830  | 1,830  | 3,920  | 837    | 3,200   | 2,370  | 7,420  | 8,400  | 7,660   | 2,110  | 2,020  |
| 22         | 2,020  | 1,830  | 1,830  | 3,850  | 1,010* | 3,200   | 2,060  | 8,400  | 8,400  | 7,660   | 2,110  | 1,740  |
| 23         | 2,020* | 1,740  | 1,830  | 4,380  | 1,020  | 3,200   | 1,870  | 8,510  | 7,450  | 7,660   | 2,110  | 1,480  |
| 24         | 2,020  | 1,740  | 1,830  | 4,410  | 1,010  | 3,200*  | 1,780  | 6,990  | 6,290  | 7,660   | 2,110  | 1,480  |
| 25         | 2,020  | 1,740  | 1,830  | 3,960  | 971    | 3,200   | 1,730  | 2,420  | 6,290  | 7,660   | 2,110  | 1,480  |
| 26         | 2,020  | 1,740  | 1,830  | 3,920  | 816    | 3,200   | 1,730  | 1,480  | 6,290  | 6,570   | 2,010  | 1,480  |
| 27         | 2,020  | 1,740  | 1,830  | 3,880  | 816    | 3,200   | 1,750  | 1,680  | 6,290  | 3,570   | 2,010  | 1,480  |
| 28         | 2,020  | 1,830  | 1,830  | 3,030  | 816    | 3,200   | 1,730  | 1,990  | 6,290  | 2,050   | 2,180  | 1,480  |
| 29         | 2,020  | 1,840  | 1,130  | 738    | 3,200  | 1,570   | 2,060  | 5,260  | 2,010  | 2,180   | 1,480  |        |
| 30         | 2,020  | 1,830  | 1,200* | 858    | 3,200  | 1,070   | 2,570  | 5,970  | 2,010  | 1,780   | 1,480  |        |
| 31         | 2,020  | 1,830  | 1,830  | 879    | 1,010  | 2,380   | 2,010  | 2,380  | 2,010  | 2,010   | 1,480  |        |
| <b>Sum</b> | 53,710 | 91,540 | 79,474 |        | 92,289 | 168,090 | 56,370 |        |        |         |        |        |
|            | 63,240 | 56,740 | 30,066 |        | 73,740 | 176,000 | 62,290 |        |        |         |        |        |

**Current Year 1981****Period #1968-1981**

| Month         | Extreme Gage Feet |      |                                | Extreme Second-Feet |     | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |           |           |
|---------------|-------------------|------|--------------------------------|---------------------|-----|---------------------|----------------------------------|-----------|-----------|-----------|
|               | High              | Low  | Day                            | High                | Low |                     |                                  | Average   | Maximum   | Minimum   |
| Jan.          | 2.33              | 2.07 | 112                            | 2,210               | 17  | 1,480               | 125,395                          | 84,305    | 159,193   | 14,497    |
| Feb.          | 2.30              | 2.17 | 1                              | 2,110               | 123 | 1,740               | 106,385                          | 120,125   | 448,205   | 18,633    |
| Mar.          | 2.23              | 2.20 | 126                            | 1,920               | 1   | 1,830               | 112,296                          | 133,572   | 382,036   | 17,298    |
| Apr.          | 3.28              | 1.31 | 117                            | 5,790               | 29  | 160                 | 3,050                            | 181,529   | 111,940   | 33,846    |
| May           | 2.07              | 1.54 | 116                            | 1,480               | 29  | 431                 | 971                              | 59,644    | 193,306   | 516,357   |
| June          | 4.00              | 1.77 | 16                             | 9,960               | 1   | 816                 | 2,650                            | 157,533   | 155,038   | 332,331   |
| July          | 2.62              | 1.48 | 1                              | 3,200               | 15  | 341                 | 2,380                            | 146,241   | 141,363   | 31,474    |
| Aug.          | 3.77              | 1.44 | 23                             | 8,580               | 5   | 300                 | 2,980                            | 183,113   | 162,835   | 670,572   |
| Sept.         | 3.77              | 1.44 | 116                            | 8,580               | 2   | 300                 | 5,860                            | 349,134   | 240,559   | 1,327,497 |
| Oct.          | 4.53              | 1.97 | 13                             | 13,400              | 1   | 1,240               | 5,440                            | 333,654   | 182,666   | 815,207   |
| Nov.          | 2.43              | 1.48 | 129                            | 2,520               | 30  | 341                 | 2,080                            | 123,658   | 109,455   | 527,524   |
| Dec.          | 2.46              | 2.03 | 1                              | 2,630               | 30  | 1,390               | 1,820                            | 111,730   | 81,191    | 228,774   |
|               | 4.53              | 1.31 |                                | 13,400              |     | 160                 | 2,750                            | 1,990,312 | 1,716,355 | 3,743,795 |
| <b>Meters</b> |                   |      | <b>Cubic Meters per Second</b> |                     |     |                     | <b>Thousands of Cubic Meters</b> |           |           |           |
|               | 1.38              | 0.40 |                                | 379                 |     | 4.54                | 77.8                             | 2,455,048 | 2,117,125 | 4,617,971 |
|               |                   |      |                                |                     |     |                     |                                  |           |           | 627,337   |

\*\* Period 1968-1981 \* Discharge measurement made on this day ! And other days

# Values for January 1968 are Rio Grande near Del Rio less Arroyo Las Vacas flow

## ARROYO DE LAS VACAS AT CD. ACUNA, COAHUILA

**DESCRIPTION:** Cableway with sit-down cable car, concrete wall with a V-shape concrete control weir of 353 second-foot ( $10 \text{ m}^3/\text{sec}$ ) capacity, gravity well, and water-stage recorder located on the left bank at Cd. Acuna, Coahuila, latitude  $29^{\circ}19'45''$ , longitude  $100^{\circ}57'20''$  and 1.8 creek miles (3 km) from the confluence with the Rio Grande. This stream enters the Rio Grande at river mile 561.0 (902.9 km) on the upstream side of the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila and 12.9 river miles (20.7 km) downstream from Amistad Dam. The zero of the gage is 865.82 feet (270 m) above mean sea level, U.S.C. & G.S. datum.

**RECORDS:** Based on 13 discharge measurements during the year, a stable rating curve up to 353 second-feet ( $10 \text{ m}^3/\text{sec}$ ), which is the capacity of the weir, and a continuous record of gage heights. Computations by shifting control methods for flows exceeding the capacity of the weir. During 1981, the capacity of the weir was exceeded on April 17, 18, 23, May 2, June 16, and October 6. Records available: Occasional estimates from June 1935 to March 19, 1938 and a continuous record from March 20, 1938 through 1981.

**REMARKS:** Low flow of this stream is from springs and is modified by irrigation diversions upstream. On June 17, 1961, a flood destroyed the station, leaving the control wall under several feet of silt. The station was reconstructed in September and a V-shape concrete control weir with a capacity of 353 second-feet ( $10 \text{ m}^3/\text{sec}$ ), constructed at this station, started operating December 14, 1961. On June 28, 1954, backwater from the Rio Grande reached an elevation of 902.49 feet (275.08 m) at this station. Records prior to 1965 were published under the title "Arroyo Las Vacas near Cd. Acuna, Coahuila."

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 63,570 second-feet ( $1,800 \text{ m}^3/\text{sec}$ ) with a gage height of 25.26 feet (7.70 m) on June 17, 1961. Min. no flow several occasions in 1956, 1957, 1960, 1961, and September 1, 1967.

|  | Daily:   | Max. 23,940 (678) | June 17, 1961 | Min. 0          | Several days Dec. 1956, Jan. 1957, & Sept. 1, 1967 |
|--|----------|-------------------|---------------|-----------------|--|
|  | Monthly: | Max. 1,050 (29.8) | June 1961     | Min. 0.4 (0.01) | Several months 1952, 1953, & 1954                  |
|  | Yearly:  | Max. 96.7 (2.74)  | 1961          | Min. 2.8 (0.08) | 1952   |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March | April   | May   | June    | July | Aug.  | Sept. | Oct.    | Nov. | Dec.  |
|------------|-------|-------|-------|---------|-------|---------|------|-------|-------|---------|------|-------|
| 1          | 3.5   | 8.5   | 6.0   | 6.0     | 30.7  | 9.2     | 9.5  | 5.3   | 3.5   | 3.9     | 12.7 | 7.1   |
| 2          | 4.9   | 8.1   | 6.7   | 6.0     | 132   | 7.8     | 8.5  | 4.6   | 3.5   | 3.9     | 12.7 | 8.8   |
| 3          | 6.7   | 5.7   | 7.8   | 6.0     | 48.0  | 6.7     | 7.8  | 4.6   | 3.2   | 3.9     | 12.7 | 9.2   |
| 4          | 7.1   | 5.7   | 6.7   | 5.7     | 35.0  | 106     | 7.1  | 4.2   | 3.2   | 3.5     | 12.7 | 8.8   |
| 5          | 8.5   | 6.0   | * 6.0 | 4.9     | 29.7  | 6.7     | 6.7  | 4.6   | 3.2   | 3.5     | 12.7 | 8.5   |
| 6          | 8.5   | 6.7   | 6.0   | 4.9     | 25.4  | 7.8     | 6.7  | 4.6   | 3.2   | 2,050   | 11.3 | 8.1   |
| 7          | 5.7   | 6.0   | 6.4   | 4.9     | 22.6  | 8.5     | 8.1  | 4.2   | 3.2   | 85.1    | 8.5  | 7.1   |
| 8          | 4.9   | 6.7   | 5.3   | 4.9     | 20.1  | 8.1     | 6.7  | 4.6   | 3.2   | * 33.9  | 8.5  | 7.1   |
| 9          | 7.1   | 6.7   | 4.9   | 4.9     | 16.6  | 7.4     | 6.7  | 4.6   | 3.2   | 25.8    | 7.8  | 7.1   |
| 10         | 6.0   | 7.4   | 5.3   | 4.9     | 14.8  | 6.0     | 6.4  | 4.6   | 3.2   | 20.5    | 6.4  | 7.1   |
| 11         | 5.7   | 6.4   | 7.1   | 4.9     | 17.7  | 5.7     | 5.7  | 3.5   | *     | 3.2     | 19.1 | 6.0   |
| 12         | 4.6   | 4.9   | 8.8   | 5.3     | 16.6  | 6.0     | 6.4  | 3.5   | 2.8   | 17.7    | 6.0  | 7.1   |
| 13         | 4.9   | 4.9   | 9.2   | 5.3     | 15.9  | 6.0     | 5.3  | 3.5   | 2.8   | 56.9    | 7.1  | 8.5   |
| 14         | 4.9   | 7.8   | 9.2   | 9.9     | 14.8  | 5.7     | 5.3  | *     | 3.2   | 22.6    | 6.4  | 9.2   |
| 15         | * 4.2 | 7.8   | 8.5   | 55.8    | 14.8  | 263     | 5.3  | 3.2   | 2.8   | 19.1    | 6.0  | 9.2   |
| 16         | 4.2   | 4.9   | 7.8   | 177     | 14.8  | 1,070   | 4.9  | 3.5   | 2.8   | 16.6    | 6.0  | 8.5   |
| 17         | 4.9   | 4.6   | 7.1   | 544     | 12.7  | 58.6    | 4.9  | 3.5   | 2.8   | 16.6    | 7.1  | 8.5   |
| 18         | 9.9   | 4.6   | 6.7   | 459     | 11.3  | 34.6    | 4.9  | 3.5   | 2.8   | 14.8    | 6.4  | 8.5   |
| 19         | 12.7  | 4.6   | 5.3   | 138     | 8.5   | 28.0    | 4.6  | 3.5   | 3.2   | 14.8    | 6.0  | 8.5   |
| 20         | 12.7  | 4.2   | 6.0   | 41.0    | 7.8   | 24.0    | 4.6  | 3.5   | 3.2   | 14.8    | 6.4  | 9.2   |
| 21         | 11.3  | 4.2   | 7.8   | 28.3    | * 7.8 | 22.6    | 4.2  | 3.2   | 2.8   | 14.8    | 6.4  | 8.5   |
| 22         | 11.3  | 5.7   | 6.4   | 25.4    | * 7.8 | 21.2    | 4.6  | 3.2   | 2.8   | 16.6    | 8.5  | 7.1   |
| 23         | 9.5   | 4.6   | 7.1   | 992 *   | 7.1   | 19.1    | 4.2  | 3.5   | 3.2   | 15.5    | 9.2  | 6.4   |
| 24         | 9.5   | 4.2   | 6.4   | 247     | 11.3  | 18.0    | 4.2  | 3.5   | 2.8   | 14.8    | 8.5  | 6.4   |
| 25         | 9.5   | * 4.9 | 5.3   | 59.0    | 17.0  | *       | 16.6 | 4.2   | 3.2   | 2.8     | 14.8 | 7.4   |
| 26         | 9.5   | 4.9   | 5.3   | 44.1    | 7.8   | 15.9    | 4.2  | 3.2   | 2.8   | 12.7    | 8.5  | 7.8   |
| 27         | 9.5   | 4.9   | 5.3   | 36.4    | 6.7   | 16.6    | 3.9  | 3.2   | 2.8   | 12.7    | 7.8  | 7.1   |
| 28         | 8.5   | 6.0   | 6.4   | 31.4    | 6.7   | 14.8    | 3.9  | 3.2   | 3.5   | 12.7    | 7.8  | 7.8   |
| 29         | 8.5   |       | 6.4   | *       | 28.3  | 6.0     | 14.8 | 3.9   | 3.2   | 4.2     | 12.7 | 7.8   |
| 30         | 8.5   |       | 6.4   | 95.3    | 6.0   | 13.8    | 4.9  | 3.5   | 4.6   | 12.7    | 7.1  | 9.9   |
| 31         | 9.5   |       | 6.4   |         | 7.1   |         | 4.9  | 3.5   | 3.5   | 12.7    |      | 10.9  |
| <b>Sum</b> |       | 161.6 |       | 3,080.5 |       | 1,849.5 |      | 116.7 |       | 2,599.7 |      | 250.3 |
|            |       | 236.7 |       | 206.0   |       | 601.1   |      | 173.2 |       | 94.5    |      | 249.5 |

| Month  | Current Year 1981         |      |                     |        | Period 1938-1981          |                 |           |         |
|--------|---------------------------|------|---------------------|--------|---------------------------|-----------------|-----------|---------|
|        | Extreme Gage Feet         |      | Extreme Second-Feet |        | Average Second-Feet       | Total Acre-Feet | Acre-Feet |         |
|        | High                      | Low  | Day                 | Day    |                           |                 | Average   | Maximum |
| Jan.   | 0.62                      | 0.36 | 119                 | 12.7   | 1                         | 3.5             | 7.8       | 470     |
| Feb.   | .59                       | .39  | 1                   | 11.3   | 116                       | 4.2             | 5.7       | 321     |
| Mar.   | .59                       | .43  | 14                  | 11.3   | 1                         | 4.9             | 6.7       | 408     |
| Apr.   | 5.12                      | .43  | 23                  | 3,120  | 1                         | 5               | 103       | 6,112   |
| May    | 2.76                      | .43  | 2                   | 685    | 29                        | 4.9             | 19.4      | 1,193   |
| June   | 7.02                      | .39  | 16                  | 6,070  | 3                         | 4.2             | 61.1      | 3,660   |
| July   | .59                       | .33  | 1                   | 11.3   | 27                        | 2.8             | 5.7       | 344     |
| Aug.   | .46                       | .33  | 1                   | 6.0    | 28                        | 2.8             | 3.9       | 232     |
| Sept.  | .43                       | .30  | 29                  | 5.7    | 112                       | 2.1             | 3.2       | 187     |
| Oct.   | 10.20                     | .36  | 6                   | 12,200 | 1                         | 1               | 3.5       | 5,160   |
| Nov.   | .62                       | .39  | 6                   | 13.8   | 14                        | 4.2             | 8.5       | 494     |
| Dec.   | .62                       | .46  | 31                  | 12.7   | 1                         | 6.0             | 8.1       | 495     |
| Yearly | 10.20                     | 0.30 |                     | 12,200 |                           | 2.1             | 26.5      | 19,076  |
|        | Meters                    |      |                     |        | Cubic Meters per Second   |                 |           |         |
|        | 3.11                      | 0.09 |                     | 346    |                           | 0.06            | 0.75      | 23,530  |
|        | Thousands of Cubic Meters |      |                     |        | Thousands of Cubic Meters |                 |           |         |
|        |                           |      |                     |        |                           | 18,109          | 86,384    | 2,555   |

\*\* Period 1938-1981

\* Discharge measurement made on this day

! And other days

### SAN FELIPE SPRINGS AT DEL RIO, TEXAS

**DESCRIPTION:** Two large and at least two smaller springs rise near the northeast city limits of Del Rio, Texas in or near the channel of San Felipe Creek at latitude 29°22'20" and longitude 100°53'00". The total yield of these springs consists of waters measured in the Val Verde Canal at Del Rio, Texas and in San Felipe Creek at Moore Park, Del Rio, Texas and diversions by the city of Del Rio. Diversions by the San Felipe Irrigation Company through the Val Verde Canal are measured at a gaging station consisting of a paved measuring section and gravity well and water-stage recorder located on the left side of the canal under the U. S. Highway 277 Bridge across San Felipe Creek at latitude 29°21'55" and longitude 100°53'10". The bridge is located about 0.6 creek mile (1.0 km) downstream from the source of the springs and 2.9 creek miles (4.7 km) from the confluence of the creek with the Rio Grande. The gaging station on San Felipe Creek at Moore Park consists of a gravity well and water-stage recorder located on the left bank about 300 feet (91 m) downstream from the U.S. Highway 277 Bridge at latitude 29°21'50" and longitude 100°53'10". This stream enters the Rio Grande at river mile 560.5 (902.1 km), 0.5 river mile (0.8 km) downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zeros of the gages for the two stations are, respectively, 942.58 feet (287.30 m) and 930.77 feet (283.70 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Records for the Val Verde Canal and San Felipe Creek at Moore Park are based on 52 and 52 discharge measurements, respectively, by wading during the year, and continuous records of gage heights. Computations by shifting control methods. Records for the Del Rio Pumping Plant are furnished by the City of Del Rio Water Department. Records available: Total yield of the springs, February 1961 through 1981.

**REMARKS:** The flows tabulated below represent only the total yield of the springs. All storm runoff has been eliminated from the tabulations.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                 |               |                  |               |
|----------|-----------------|---------------|------------------|---------------|
| Daily:   | Max. 171 (4.84) | July 23, 1976 | Min. 29.2 (0.83) | July 29, 1964 |
| Monthly: | Max. 153 (4.33) | December 1976 | Min. 34.4 (0.97) | August 1964   |
| Yearly:  | Max. 149 (4.22) | 1977          | Min. 50.5 (1.43) | 1963          |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.    | Feb.    | March | April | May | June | July  | Aug.  | Sept. | Oct. | Nov. | Dec. |
|------------|---------|---------|-------|-------|-----|------|-------|-------|-------|------|------|------|
| 1          | 91.1    | 90.4    | 87.6  | 102   | 109 | 118  | 124   | 127   | 129   | 131  | 132  | 129  |
| 2          | 91.5    | 90.4    | 84.8  | 101   | 111 | 118  | 126   | 126   | 129   | 132  | 132  | 129  |
| 3          | 89.3    | 90.4    | 85.8  | 101   | 111 | 119  | 120   | 128   | 129   | 134  | 131  | 131  |
| 4          | 88.6    | 90.8    | 84.8  | 96.1  | 111 | 115  | 119   | 127   | 129   | 130  | 131  | 130  |
| 5          | 87.2    | 90.8    | 85.5  | 98.2  | 113 | 113  | 121   | 125   | 130   | 130  | 131  | 132  |
| 6          | 87.6    | 90.8    | 85.1  | 94.6  | 112 | 112  | 125   | 126   | 130   | 130  | 132  | 129  |
| 7          | 89.0    | 90.8    | 89.0  | 93.6  | 111 | 114  | 126   | 130   | 130   | 131  | 131  | 130  |
| 8          | 86.9    | 88.6    | 90.8  | 92.5  | 110 | 115  | 126   | 126   | 130   | 130  | 130  | 131  |
| 9          | 88.6    | 86.9    | 84.8  | 92.2  | 110 | 116  | 128   | 126   | 131   | 132  | 130  | 131  |
| 10         | 89.3    | 88.3    | 89.3  | 93.2  | 110 | 120  | 130   | 125   | 129   | 131  | 132  | 132  |
| 11         | 90.4    | 87.6    | 93.6  | 93.9  | 110 | 119  | 127   | 126   | 130   | 130  | 132  | 132  |
| 12         | 89.0    | 86.5    | 96.4  | 94.6  | 113 | 113  | 125   | 125   | 127   | 130  | 133  | 132  |
| 13         | 91.5    | 85.8    | 95.3  | 92.5  | 114 | 118  | 121   | 125   | 128   | 133  | 133  | 131  |
| 14         | 90.4    | 87.6    | 95.7  | 93.9  | 111 | 118  | 119   | 124   | 128   | 131  | 133  | 131  |
| 15         | 88.6    | 87.2    | 97.5  | 94.9  | 113 | 120  | 119   | 127   | 129   | 133  | 133  | 131  |
| 16         | 89.3    | 86.5    | 97.1  | 95.3  | 112 | 147  | 118   | 128   | 130   | 131  | 132  | 131  |
| 17         | 89.7    | 85.1    | 98.2  | 93.9  | 112 | 127  | 119   | 125   | 127   | 133  | 133  | 131  |
| 18         | 89.3    | 87.9    | 96.1  | 95.3  | 109 | 125  | 124   | 129   | 128   | 132  | 132  | 132  |
| 19         | 89.7    | 84.8    | 94.6  | 93.2  | 111 | 121  | 124   | 129   | 126   | 134  | 131  | 130  |
| 20         | 89.7    | 85.8    | 95.0  | 93.2  | 113 | 118  | 125   | 130   | 126   | 135  | 130  | 130  |
| 21         | 86.9    | 86.2    | 93.2  | 93.6  | 114 | 115  | 124   | 127   | 128   | 132  | 129  | 131  |
| 22         | 87.6    | 88.6    | 94.6  | 92.3  | 116 | 118  | 125   | 128   | 128   | 135  | 128  | 131  |
| 23         | 88.6    | 87.6    | 93.6  | 104   | 117 | 119  | 127   | 128   | 129   | 133  | 129  | 135  |
| 24         | 90.1    | 89.0    | 95.0  | 103   | 113 | 118  | 128   | 129   | 131   | 137  | 129  | 139  |
| 25         | 89.3    | 89.7    | 92.9  | 102   | 114 | 119  | 130   | 128   | 131   | 135  | 129  | 139  |
| 26         | 88.6    | 90.8    | 93.9  | 103   | 111 | 120  | 129   | 131   | 132   | 135  | 130  | 142  |
| 27         | 89.0    | 86.9    | 92.9  | 105   | 113 | 119  | 126   | 128   | 131   | 135  | 130  | 147  |
| 28         | 89.7    | 89.3    | 97.5  | 107   | 113 | 120  | 123   | 126   | 132   | 136  | 130  | 141  |
| 29         | 89.7    | 99.1    | 109   | 114   | 119 | 124  | 130   | 133   | 135   | 131  | 135  |      |
| 30         | 88.3    | 99.9    | 107   | 115   | 124 | 123  | 130   | 134   | 132   | 129  | 136  |      |
| 31         | 89.7    | 101     |       | 116   |     |      | 125   | 131   | 133   |      |      |      |
| <b>Sum</b> | 2,471.1 | 2,931.0 |       | 3,583 |     |      | 3,950 | 4,113 | 4,124 |      |      |      |
|            | 2,764.2 | 2,878.6 |       | 3,482 |     |      | 3,850 | 3,884 | 3,928 |      |      |      |

### Current Year 1981

Period Feb. 1961-1981

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |         |         |
|---------------|-------------------|------|-----|--------------------------------|------|---------------------|----------------------------------|-----------|---------|---------|
|               | High              | Low  | Day | High                           | Low  |                     |                                  | Average   | Maximum | Minimum |
| Jan.          | ! 2               | 91.5 | ! 8 | 86.9                           | 89.3 | 5,483               | 6,628                            | 9,370     | 2,274   |         |
| Feb.          | ! 4               | 90.8 | 19  | 84.8                           | 88.3 | 4,900               | 5,850                            | 8,212     | 2,119   |         |
| Mar.          | 31                | 101  | ! 2 | 84.8                           | 92.9 | 5,712               | 6,356                            | 9,029     | 2,365   |         |
| Apr.          | 29                | 109  | 9   | 92.2                           | 97.8 | 5,820               | 6,100                            | 8,602     | 2,291   |         |
| May           | 23                | 117  | ! 1 | 109                            | 112  | 6,902               | 6,439                            | 9,300     | 2,842   |         |
| June          | 16                | 147  | 6   | 112                            | 119  | 7,104               | 6,241                            | 9,049     | 2,481   |         |
| July          | 110               | 130  | 16  | 118                            | 124  | 7,635               | 6,448                            | 9,342     | 2,214   |         |
| Aug.          | 126               | 131  | 14  | 124                            | 127  | 7,835               | 6,427                            | 9,039     | 2,114   |         |
| Sept.         | 30                | 134  | 119 | 126                            | 130  | 7,709               | 6,296                            | 8,684     | 2,555   |         |
| Oct.          | 24                | 137  | ! 4 | 130                            | 133  | 8,161               | 6,701                            | 9,249     | 2,508   |         |
| Nov.          | 12                | 133  | 22  | 128                            | 131  | 7,793               | 6,503                            | 8,965     | 2,384   |         |
| Dec.          | 27                | 147  | ! 1 | 129                            | 133  | 8,185               | 6,789                            | 9,431     | 2,390   |         |
|               |                   | 147  |     | 84.8                           | 115  | 83,239              | 76,778                           | 107,892   | 36,580  |         |
| <b>Yearly</b> | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |      |                     | <b>Thousands of Cubic Meters</b> |           |         |         |
|               |                   |      |     | 4.16                           | 2.40 | 3.26                | 102,674                          | 94,708    | 133,085 | 45,121  |

Ø Mean daily

! And other days

## SAN FELIPE CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Cableway, bubbler gage, and water-stage recorders (graphic and digital) located on the right bank at latitude 29°19'50", longitude 100°53'20", immediately upstream from the Silos Farm road bridge, 1.1 creek miles (1.8 km) from the confluence with the Rio Grande, and about 2 miles (3.2 km) south-southeast of Del Rio, Texas. This stream enters the Rio Grande at river mile 560.5 (902.1 km), 0.5 river mile (0.8 km) downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 877.43 feet (267.44 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 52 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: September 1931 through 1981.

**REMARKS:** Municipal diversions at Del Rio and irrigation diversions greatly modify the flow of this spring-fed creek at this station. Backwater from the Rio Grande reaches this station when the Rio Grande near Del Rio reaches a stage of 15 feet (4.6 m), or a flow of about 60,000 second-feet (1,700 m³/sec). On June 28, 1954 combined creek flow and backwater from the Rio Grande reached a stage of 24.51 feet (7.47 m), the highest of record, at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 45,000 second-feet (1,270 m³/sec) on June 14, 1935 with a gage height of 23.20 feet (7.07 m). Min. 0.4 second-foot (0.01 m³/sec) on July 20, 1953.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |               |                  |               |
|----------|-------------------|---------------|------------------|---------------|
| Daily:   | Max. 16,200 (459) | June 14, 1935 | Min. 1.5 (0.04)  | July 21, 1953 |
| Monthly: | Max. 805 (22.8)   | June 1935     | Min. 4.6 (0.13)  | July 1953     |
| Yearly:  | Max. 136 (3.85)   | 1935          | Min. 25.1 (0.71) | 1953          |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day | Jan.   | Feb.    | March   | April   | May    | June    | July   | Aug.    | Sept.  | Oct.  | Nov. | Dec. |
|-----|--------|---------|---------|---------|--------|---------|--------|---------|--------|-------|------|------|
| 1   | 77.7   | 87.2    | 56.1    | 62.2    | 102    | 86.5    | 94.3   | 92.5    | * 94.6 | 90.8  | 115  | 100* |
| 2   | 78.8   | 88.3    | 55.9    | 63.2    | 145    | * 86.9  | 92.5   | 89.7    | * 94.6 | 90.0  | 112  | 101  |
| 3   | 76.6   | * 89.0  | * 56.9  | 63.2    | 107    | 88.6    | 95.7   | 89.3    | * 95.3 | 89.3  | 111* | 105  |
| 4   | 77.7   | 87.9    | 56.2    | 64.3    | 106    | 115     | 99.2   | * 96.8  | * 94.3 | 89.7  | 109  | 106  |
| 5   | 78.4   | 86.9    | 57.9    | 66.7    | 107    | 102     | 90.1   | 99.9    | * 88.3 | 106   | 106  | 106  |
| 6   | * 82.6 | 86.2    | 59.0    | 67.5    | 107    | 106     | 99.9   | 89.7    | 102    | 175   | 102  | 111  |
| 7   | 78.8   | 85.1    | 59.0    | * 71.3  | 108    | 108     | 104    | 86.2    | 98.2   | 127   | 102  | 111  |
| 8   | 81.6   | 84.0    | 59.0    | 65.7    | 110    | 101     | 102    | 179     | 114    | 126   | 104  | 104  |
| 9   | 80.9   | * 79.8  | * 60.7  | 65.7    | 108    | * 98.2  | 99.6   | 119     | * 101  | 125   | 106  | 103  |
| 10  | 84.0   | 80.2    | 61.8    | 69.6    | 110    | 95.7    | 99.2   | 118     | * 97.5 | 122   | 108  | 103  |
| 11  | 83.3   | 80.2    | 70.3    | 65.3    | 105    | 91.1    | 97.5   | 113     | 98.2   | 121   | 108  | 103  |
| 12  | 83.0   | 80.5    | 73.5    | 62.2    | 102    | 105     | 93.9   | 111*    | 99.9   | 119   | 110  | 103  |
| 13  | * 82.3 | 80.5    | 70.3    | 60.7    | 98.9   | 99.9    | 103    | 108     | 99.2   | 189   | 111  | 103  |
| 14  | 78.8   | 80.9    | 73.8    | * 65.7  | 97.5   | 95.7    | * 97.5 | 101     | * 100  | 131   | 111  | 103  |
| 15  | 75.6   | 80.9    | 74.2    | 96.7    | 90.4   | 111     | 86.2   | 95.0    | * 95.7 | 130   | 111  | 102  |
| 16  | 75.6   | 71.0    | 75.9    | 86.5    | 84.8   | 593     | 82.3   | 89.7    | 93.2   | 130   | 110  | 103  |
| 17  | 82.6   | 74.5    | 84.4    | 96.8    | 79.8   | 122     | 83.7   | 93.6    | 95.7   | 129   | 110  | 103  |
| 18  | 82.6   | * 74.9  | * 83.0  | 93.9    | 79.5   | 123     | 83.3   | * 93.9  | 99.9   | 127   | 108  | 103  |
| 19  | 82.6   | 74.2    | 81.9    | 91.5    | * 81.6 | 120     | 86.2   | 92.9    | 102    | 126   | 110  | 104  |
| 20  | * 82.6 | 63.9    | 81.6    | 85.8    | 80.9   | 121     | 85.8   | 89.0    | 102    | 126   | 111  | 105  |
| 21  | 79.8   | 62.9    | 76.3    | * 89.0  | 80.5   | 117     | * 89.0 | 85.1    | 101    | 125   | 110  | 105  |
| 22  | 80.2   | 61.8    | 77.3    | 98.5    | 80.9   | 118     | 90.4   | 86.5    | * 99.9 | 135   | 107  | 105* |
| 23  | 80.9   | 51.9    | 64.6    | 406     | 80.9   | 119     | 91.5   | 87.6    | 101    | 131   | 105  | 113  |
| 24  | 78.4   | * 54.4  | * 58.3  | 141     | 85.5   | 118     | 91.8   | 88.6    | 102    | 130   | 103  | 118  |
| 25  | 79.1   | 54.7    | 64.6    | 102     | 89.3   | 115     | 92.9   | * 89.3  | 104    | 130   | 105  | 118  |
| Sum |        | 2,066.7 | 2,788.2 | 3,743.6 |        | 3,045.1 |        | 3,823.1 |        | 3,354 |      |      |
|     |        | 2,496.1 | 2,131.0 | 2,960.8 |        | 2,961.9 |        | 3,008.4 |        | 3,221 |      |      |

**Current Year 1981****Period 1932-1981**

| Month  | Extreme Gage Feet                        |      |     | Extreme Second-Feet     |     | Average Second-Feet | Total                     | Acre-Feet |         |         |  |  |
|--------|--|------|-----|-------------------------|-----|---------------------|---------------------------|-----------|---------|---------|--|--|
|        | High                                     |      | Low | Day                     |     |                     |                           | Average   | Maximum | Minimum |  |  |
|        | High                                     | Low  | Day | Day                     | Day |                     |                           | Average   | Maximum | Minimum |  |  |
| Jan.   | 1.08                                     | 0.82 | 19  | 92.9                    | 29  | 71.3                | 80.5                      | 4,951     | 4,926   | 8,906   |  |  |
| Feb.   | .98                                      | .36  | 3   | 92.5                    | 20  | 29.3                | 73.8                      | 4,099     | 4,025   | 8,630   |  |  |
| Mar.   | 1.15                                     | .62  | 28  | 104                     | 123 | 49.1                | 4,226                     | 3,829     | 8,354   | 689     |  |  |
| Apr.   | 6.04                                     | .66  | 23  | 1,080                   | 12  | 54.4                | 92.9                      | 5,529     | 4,260   | 10,407  |  |  |
| May    | 3.16                                     | .79  | 2   | 364                     | 17  | 68.9                | 95.3                      | 5,870     | 4,995   | 17,600  |  |  |
| June   | 8.40                                     | .82  | 16  | 2,090                   | 15  | 70.6                | 125                       | 7,422     | 5,259   | 47,900  |  |  |
| July   | 1.41                                     | .98  | 9   | 117                     | 115 | 75.2                | 95.7                      | 5,874     | 4,309   | 22,077  |  |  |
| Aug.   | 5.28                                     | .98  | 8   | 855                     | 7   | 79.1                | 98.2                      | 6,043     | 3,877   | 7,584   |  |  |
| Sept.  | 3.02                                     | 1.12 | 8   | 333                     | 4   | 85.1                | 100                       | 5,972     | 5,221   | 350     |  |  |
| Oct.   | 4.95                                     | 1.08 | 13  | 752                     | 5   | 77.3                | 123                       | 7,587     | 28,678  | 872     |  |  |
| Nov.   | 1.61                                     | 1.41 | 13  | 120                     | 5   | 92.5                | 107                       | 5,111     | 14,229  | 1,000   |  |  |
| Dec.   | 1.90                                     | 1.48 | 28  | 155                     | 9   | 99.6                | 108                       | 6,386     | 4,381   | 8,567   |  |  |
|        | 8.40                                     | 0.36 |     | 2,090                   |     | 29.3                | 97.5                      | 70,612    | 54,692  | 98,137  |  |  |
| Yearly | Meters                                   |      |     | Cubic Meters per Second |     |                     | Thousands of Cubic Meters |           |         |         |  |  |
|        | 2.56                                     | 0.11 |     | 59.3                    |     | 0.83                | 2.76                      | 87,100    | 67,461  | 121,052 |  |  |
|        | * Discharge measurement made on this day |      |     | ! And other days        |     |                     | 22,451                    |           |         |         |  |  |

**DIVERSIONS FROM THE RIO GRANDE  
MAVERICK CANAL AT MILE 13 NEAR QUEMADO, TEXAS**

**DESCRIPTION:** Light-weight cableway for making current meter measurements from the bank, bubbler gage, and water-stage recorders (graphic and digital), located on the left bank of a gunnite-lined section of the canal at latitude 29°03'00", longitude 100°39'40", 0.5 canal mile (0.8 km) downstream from the Tequesquite Creek Siphon, 3.5 canal miles (5.6 km) upstream from the Las Moras Creek Siphon, about 7.5 miles (12.1 km) northwest of Quemado, Maverick County, Texas, and 12.8 canal miles (20.6 km) from the canal intake. The canal intake is at river mile 543.6 (874.9 km), 17.4 river miles (28.0 km) downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on 24 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Gage heights at this station are affected by gate operation at Las Moras Siphon. Records available: June 21, 1949 through 1981.

**REMARKS:** At canal mile 31.8 (51.2 km) a portion of the diverted water returns to the river through the Maverick Power Plant, and the remainder enters the Maverick Canal Extension. In 1981, 10,782 acres (4,363 ha) of land were irrigated between canal mile 31.8 (51.2 km) and the power plant, and 27,582 acres (11,162 ha) were irrigated from the extension, making a total of 38,364 acres (15,525 ha). A total of 957,353 acre-feet (1,180,894,000 m<sup>3</sup>) returned to the Rio Grande at the power plant and through the irrigation system (see pages 51, 53, and 56).

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,750 second-feet (49.6 m<sup>3</sup>/sec) on August 30, 1973. Min. No flow several days in June, July, and November 1958; and October 1978.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          | Max. | 1,730 (49.0) | August 29, 1973 | Min. 0          | Oct. 2 & 3, 1978 |
|----------|------|--------------|-----------------|-----------------|------------------|
| Monthly: | Max. | 1,600 (45.4) | September 1981  | Min. 295 (8.35) | February 1977    |
| Yearly:  | Max. | 1,490 (42.2) | 1980 & 1981     | Min. 632 (17.9) | 1972             |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.          | Feb.          | March         | April   | May     | June          | July    | Aug.    | Sept.         | Oct.          | Nov.    | Dec.    |
|------------|---------------|---------------|---------------|---------|---------|---------------|---------|---------|---------------|---------------|---------|---------|
| 1          | 1,540         | 1,600         | 1,590         | 1,590   | 1,180   | 851 *         | 1,630   | 1,020   | 1,520 *       | 1,580         | 1,640   | 1,510 * |
| 2          | 1,540         | 1,590         | 1,580 *       | 1,590   | 1,240   | 809           | 1,610   | 985     | 1,320         | 1,450         | 1,630 * | 1,600   |
| 3          | 1,540         | 1,600 *       | 1,560         | 1,590   | 1,250   | 819           | 1,610   | 961     | 1,370         | 1,370         | 1,610   | 1,620   |
| 4          | 1,550         | 1,610         | 1,560         | 1,600   | 1,150 * | 908           | 1,610   | 971 *   | 1,660         | 1,360         | 1,620   | 1,620   |
| 5          | 1,550         | 1,610         | 1,560         | 1,600   | 1,090   | 1,310         | 1,600   | 1,060   | 1,650         | 1,360 *       | 1,620   | 1,620   |
| 6          | 1,540         | 1,600         | 1,560         | 1,610 * | 685     | 1,420         | 1,640 * | 883     | 1,600         | 1,440         | 1,600   | 1,640   |
| 7          | 1,540         | 1,600         | 1,560         | 1,620   | 154     | 1,490         | 1,620   | 1,230   | 1,610         | 1,540         | 1,600   | 1,600   |
| 8          | 1,550         | 1,600         | 1,560         | 1,600   | 154     | 1,450         | 1,600   | 1,340   | 1,650         | 1,600         | 1,610   | 1,610   |
| 9          | 1,540         | 1,590         | 1,560         | 1,580   | 154     | 1,500         | 1,580   | 1,490   | 1,610         | 1,610         | 1,590   | 1,620   |
| 10         | 1,540         | 1,600         | 1,560         | 1,590   | 154     | 1,510         | 1,540   | 1,510   | 1,640         | 1,600         | 1,590   | 1,620   |
| 11         | 1,560         | 1,580         | 1,560         | 1,610   | 537     | 1,540         | 1,520   | 1,510   | 1,620         | 1,610         | 1,570   | 1,630   |
| 12         | 1,560 *       | 1,600         | 1,560         | 1,620   | 929     | 1,500         | 1,520   | 1,510   | 1,620         | 1,610         | 1,560   | 1,610   |
| 13         | 1,560         | 1,610         | 1,560         | 1,620   | 939     | 1,480         | 1,540   | 1,510   | 1,640         | 1,670         | 1,550   | 1,600   |
| 14         | 1,570         | 1,600         | 1,560         | 1,600   | 936     | 1,490         | 1,530   | 1,520   | 1,640 *       | 1,650         | 1,530   | 1,610   |
| 15         | 1,590         | 1,600         | 1,550         | 1,570   | 946     | 1,500 *       | 1,510   | 1,530   | 1,670         | 1,530         | 1,600   | 1,600   |
| 16         | 1,600         | 1,590         | 1,550         | 1,560   | 1,060   | 1,500         | 1,340   | 1,540   | 1,590         | 1,680         | 1,520 * | 1,600 * |
| 17         | 1,510         | 1,580 *       | 1,550 *       | 1,540   | 1,270   | 1,500         | 1,510   | 1,510   | 1,580         | 1,660         | 1,510   | 1,590   |
| 18         | 1,460         | 1,590         | 1,550         | 1,570   | 1,320 * | 1,550         | 1,510   | 1,540 * | 1,650         | 1,660         | 1,520   | 1,610   |
| 19         | 1,520         | 1,580         | 1,550         | 1,580   | 1,100   | 1,590         | 1,540   | 1,580   | 1,650         | 1,660         | 1,530   | 1,620   |
| 20         | 1,600         | 1,570         | 1,560         | 1,600 * | 925     | 1,540         | 1,510 * | 1,620   | 1,650         | 1,650         | 1,530   | 1,610   |
| 21         | 1,600         | 1,580         | 1,570         | 1,610   | 784     | 1,560         | 1,490   | 1,640   | 1,640         | 1,670         | 1,540   | 1,620   |
| 22         | 1,610         | 1,570         | 1,570         | 1,610   | 996     | 1,570         | 1,480   | 1,650   | 1,660         | 1,650         | 1,530   | 1,600   |
| 23         | 1,610         | 1,570         | 1,570         | 1,540   | 1,030   | 1,610         | 1,480   | 1,650   | 1,550         | 1,610         | 1,530   | 1,530   |
| 24         | 1,600         | 1,560         | 1,570         | 1,520   | 1,030   | 1,620         | 1,440   | 1,570   | 1,630         | 1,630         | 1,560   | 1,510   |
| 25         | 1,610         | 1,570         | 1,580         | 1,540   | 1,030   | 1,610         | 1,440   | 1,600   | 1,650         | 1,640         | 1,550   | 1,530   |
| 26         | 1,600         | 1,560         | 1,580         | 1,560   | 961     | 1,560         | 1,470   | 1,390   | 1,660         | 1,650         | 1,560   | 1,530   |
| 27         | 1,600 *       | 1,570         | 1,580         | 1,600   | 858     | 1,570         | 1,470   | 1,480   | 1,640         | 1,640         | 1,560   | 1,520   |
| 28         | 1,600         | 1,570         | 1,580         | 1,580   | 720     | 1,630         | 1,470   | 1,530   | 1,640         | 1,600         | 1,620   | 1,510   |
| 29         | 1,600         | 1,580         | 1,580         | 1,350   | 710     | 1,620         | 1,470   | 1,570   | 1,630         | 1,630         | 1,620   | 1,510   |
| 30         | 1,590         | 1,590         | 1,590         | 1,150   | 699     | 1,630         | 1,310   | 1,610   | 1,630         | 1,630         | 1,580   | 1,540   |
| 31         | 1,590         | 1,590         | 1,590         | 883     |         | 1,070         | 1,570   |         |               | 1,620         |         |         |
| <b>Sum</b> | <b>44,450</b> | <b>46,900</b> | <b>43,273</b> |         |         | <b>44,160</b> |         |         | <b>49,370</b> | <b>49,070</b> |         |         |
|            | <b>48,570</b> | <b>48,560</b> | <b>26,874</b> |         |         | <b>46,660</b> |         |         | <b>48,180</b> | <b>47,090</b> |         |         |

| Current Year 1981 |                   |      |                                |       |     |                     |                 |           |                                  |           |         | Period 1968-1981 |  |  |
|-------------------|-------------------|------|--------------------------------|-------|-----|---------------------|-----------------|-----------|----------------------------------|-----------|---------|------------------|--|--|
| Month             | Extreme Gage Feet |      | Extreme Second-Feet            |       |     | Average Second-Feet | Total Acre-Feet | Acre-Feet |                                  |           |         |                  |  |  |
|                   | High              | Low  | Day                            | High  | Day | Low                 |                 | Average   | Maximum                          | Minimum   |         |                  |  |  |
| Jan.              | 9.74              | 9.02 | 116                            | 1,610 | 18  | 1,430               | 1,570           | 96,312    | 65,885                           | 96,312    | 20,860  |                  |  |  |
| Feb.              | 9.68              | 9.38 | 13                             | 1,620 | 124 | 1,560               | 1,590           | 88,166    | 88,166                           | 88,166    | 16,403  |                  |  |  |
| Mar.              | 9.48              | 9.38 | 1                              | 1,590 | 115 | 1,550               | 1,560           | 96,284    | 68,316                           | 96,284    | 27,679  |                  |  |  |
| Apr.              | 9.71              | 7.74 | 7                              | 1,650 | 30  | 1,150               | 1,560           | 92,978    | 72,616                           | 92,978    | 40,721  |                  |  |  |
| May               | 8.79              | .98  | 3                              | 1,380 | 9   | 153                 | 865             | 53,306    | 78,187                           | 95,286    | 40,463  |                  |  |  |
| June              | 9.15              | 6.40 | 127                            | 1,650 | 2   | 795                 | 1,440           | 85,840    | 78,356                           | 93,302    | 31,210  |                  |  |  |
| July              | 9.48              | 7.05 | 6                              | 1,640 | 31  | 1,030               | 1,500           | 92,586    | 80,028                           | 97,657    | 35,776  |                  |  |  |
| Aug.              | 9.55              | 5.45 | 122                            | 1,650 | 6   | 735                 | 1,420           | 87,564    | 78,926                           | 97,111    | 36,708  |                  |  |  |
| Sept.             | 9.78              | 6.56 | 4                              | 1,680 | 3   | 978                 | 1,600           | 95,485    | 76,467                           | 95,485    | 32,963  |                  |  |  |
| Oct.              | 9.78              | 8.30 | 13                             | 1,690 | 5   | 1,330               | 1,590           | 97,931    | 74,959                           | 97,931    | 22,235  |                  |  |  |
| Nov.              | 9.61              | 8.96 | 1                              | 1,640 | 17  | 1,490               | 1,570           | 93,391    | 65,519                           | 93,391    | 22,487  |                  |  |  |
| Dec.              | 9.68              | 8.27 | 1                              | 1,650 | 1   | 1,320               | 1,580           | 97,279    | 63,472                           | 97,665    | 23,516  |                  |  |  |
|                   | 9.78              | 0.98 |                                | 1,690 |     | 153                 | 1,490           | 1,077,122 | 863,821                          | 1,084,048 | 458,631 |                  |  |  |
| <b>Yearly</b>     | <b>Meters</b>     |      | <b>Cubic Meters per Second</b> |       |     |                     |                 |           | <b>Thousands of Cubic Meters</b> |           |         |                  |  |  |
|                   | 2.98              | 0.30 |                                | 47.8  |     | 4.34                | 42.1            | 1,328,617 | 1,065,526                        | 1,337,173 | 565,721 |                  |  |  |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

## PINTO CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Cableway, solid ledge rock and concrete control, bubbler gage, and digital water-stage recorder located on the right bank at latitude 29°08'45", longitude 100°43'05", 1.6 creek miles (2.6 km) from the confluence with the Rio Grande, and about 19 miles (30.6 km) southeast of Del Rio, Texas. This stream enters the Rio Grande at river mile 536.9 (864.1 km), 5.6 river miles (9.1 km) downstream from the Maverick County Water Control and Improvement District No. 1 diversion dam. The zero of the gage is 813.68 feet (248.01 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 12 discharge measurements during the year and a continuous record of gage heights. Records available: September 1955 through 1981 at this station, and November 22, 1928 through August 1955 at a site 3.9 miles (6.3 km) upstream.

**REMARKS:** Small irrigation diversions modify the flow of this spring-fed creek at this station. When the flow in the Rio Grande at the confluence of this creek exceeds about 80,000 second-feet (2,270 m<sup>3</sup>/sec), backwater may reach this station. Backwater from the Rio Grande flood of June 1954 reached a gage height of 28.8 feet (8.78 m), or an elevation of 842.50 feet (256.79 m) above mean sea level, at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 186,000 second-feet (5,270 m<sup>3</sup>/sec) on June 24, 1948 with a gage height of 32.0 feet (9.75 m). Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |               |                 |            |
|----------|-------------------|---------------|-----------------|------------|
| Daily:   | Max. 28,200 (799) | June 24, 1948 | Min. 0          | Frequently |
| Monthly: | Max. 953 (27.0)   | June 1948     | Min. 0          | Frequently |
| Yearly:  | Max. 105 (2.97)   | 1932          | Min. 1.3 (0.04) | 1980       |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March | April | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.   | Dec.   |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| 1          | 1.8   | 1.1   | 2.5   | 1.1   | 7.1   | 2.5   | * 2.1 | 1.8   | * 4.9 | 10.2  | 17.0   | * 16.2 |
| 2          | .7    | 1.1   | 2.5   | 1.1   | 5.7   | * 2.5 | 2.1   | 1.8   | 50.5  | 10.2  | 16.2   | 15.2   |
| 3          | 2.1   | 1.4   | 2.8   | * 1.1 | 3.5   | 2.1   | 2.1   | 1.8   | 21.9  | 9.5   | * 16.2 | 15.2   |
| 4          | .7    | 1.4   | * 3.2 | 1.1   | 2.8   | 1.8   | 1.8   | * 1.4 | 8.8   | 8.5   | 16.2   | 15.5   |
| 5          | 0     | * 1.4 | 3.2   | 1.1   | * 2.5 | 2.1   | 1.8   | 1.4   | 6.4   | 7.8   | 16.2   | 15.5   |
| 6          | 0     | 1.4   | 2.8   | 1.1   | 2.5   | 3.2   | 1.8   | 1.8   | 6.0   | * 8.5 | 16.2   | 15.5   |
| 7          | * 1.1 | 1.4   | 2.5   | 1.1   | 1.8   | 3.2   | 1.8   | 1.8   | 5.7   | 12.7  | 16.2   | 15.5   |
| 8          | 0     | 1.4   | 2.1   | .7    | 1.8   | 2.5   | 1.8   | 3.2   | 38.5  | 13.1  | 16.2   | 16.2   |
| 9          | 0     | 1.4   | 2.1   | .7    | 1.1   | 2.1   | 1.8   | 2.1   | 12.4  | 12.7  | 15.2   | 17.0   |
| 10         | 0     | 1.8   | 1.8   | .7    | 1.4   | 1.8   | 1.8   | 2.1   | 8.1   | 12.4  | 14.8   | 17.0   |
| 11         | 0     | 1.8   | 1.8   | .7    | 1.4   | 1.8   | 1.4   | 2.5   | 7.4   | 14.1  | 15.5   | 17.0   |
| 12         | 0     | 1.8   | 1.8   | .7    | 1.4   | 32.5  | 1.4   | 2.1   | 7.4   | 14.1  | 16.6   | 17.0   |
| 13         | 0     | 1.8   | 2.1   | .7    | 1.8   | 13.4  | 1.4   | 2.1   | 7.8   | 39.9  | 17.0   | 17.0   |
| 14         | 0     | 1.8   | 2.1   | 1.1   | 1.4   | 4.6   | 1.4   | 2.1   | 8.1   | 27.9  | 17.0   | 17.0   |
| 15         | 0     | 1.8   | 2.1   | 1.1   | 1.1   | 3.9   | 1.4   | 2.1   | 10.6  | 18.4  | 17.0   | 17.3   |
| 16         | 0     | 1.8   | 1.8   | 2.1   | 1.4   | 298   | 1.4   | 1.8   | 9.9   | 14.8  | 16.6   | 17.3   |
| 17         | 0     | 1.8   | 1.8   | 2.5   | 1.4   | 273   | 1.4   | 2.1   | 12.7  | 14.1  | 16.6   | 17.3   |
| 18         | 0     | 1.8   | 1.4   | 1.4   | 1.4   | 182   | 1.4   | 2.1   | 8.5   | 13.8  | 16.6   | 17.3   |
| 19         | 0     | 2.1   | 1.8   | 1.8   | 1.4   | 42.0  | 1.4   | 2.1   | 8.8   | 12.7  | 16.6   | 18.4   |
| 20         | .7    | 2.1   | 1.8   | 1.8   | 1.1   | 13.8  | 1.4   | 2.5   | 8.8   | 13.4  | 15.5   | 18.7   |
| 21         | .7    | 2.1   | 1.8   | 1.4   | 1.1   | 5.3   | 1.4   | 2.8   | 9.2   | 14.5  | 15.5   | 18.7   |
| 22         | .4    | 2.1   | 1.8   | 1.8   | 1.1   | 4.6   | 1.4   | 2.8   | 9.5   | 30.4  | 15.5   | 18.7   |
| 23         | .4    | 2.1   | 1.8   | 273   | 1.1   | 3.9   | 1.4   | 2.8   | 9.2   | 24.7  | 15.5   | 18.7   |
| 24         | .4    | 2.1   | 1.8   | 31.8  | 1.4   | 3.9   | 1.4   | 2.5   | 9.5   | 19.8  | 15.5   | 18.7   |
| 25         | .4    | 2.1   | 1.8   | 11.7  | 1.4   | 3.2   | 1.4   | 2.1   | 9.2   | 17.6  | 15.9   | 19.1   |
| 26         | .4    | 2.1   | 1.8   | 8.1   | 1.4   | 3.2   | 1.4   | 2.1   | 8.8   | 17.6  | 15.2   | 19.1   |
| 27         | .7    | 2.1   | 1.4   | 3.9   | 1.4   | 2.8   | 1.4   | 3.5   | 8.8   | 17.6  | 15.9   | 19.1   |
| 28         | .7    | 2.1   | 1.4   | 3.2   | 1.1   | 3.2   | 1.8   | 4.9   | 8.8   | 17.3  | 16.2   | 19.1   |
| 29         | .7    | 2.1   | 1.4   | 2.8   | 1.1   | 2.5   | 1.8   | 5.7   | 8.8   | 17.3  | 16.6   | 19.1   |
| 30         | .7    | 1.4   | 2.1   | 2.1   | 1.4   | 2.5   | 1.8   | 6.4   | 9.9   | 17.3  | 16.6   | 19.4   |
| 31         | .7    | 1.4   | 2.1   | 2.1   | 2.1   | 1.8   | 1.8   | 4.9   | 17.7  |       |        |        |
| <b>Sum</b> |       | 49.6  | 364.5 | 923.9 | 81.2  | 500.6 | 542.2 |       |       |       |        |        |
| 13.3       |       | 61.5  | 58.6  | 49.9  | 344.9 | 483.8 |       |       |       |       |        |        |

## Current Year 1981

## Period 1929-1981

| Month  | Extreme Gage Feet |      | Extreme Second-Feet            |       | Average Second-Feet              | Total Acre-Feet | Acre-Feet |         |         |
|--------|-------------------|------|--------------------------------|-------|----------------------------------|-----------------|-----------|---------|---------|
|        | High              | Low  | Day                            | Day   |                                  |                 | Average   | Maximum | Minimum |
| Jan.   | 0.85              | .66  | 1                              | 4.6   | ! 5                              | 0               | 0.4       | 25.9    | 541     |
| Feb.   | .72               | .66  | 28                             | 2.5   | ! 1                              | 1.1             | 1.8       | 98.1    | 586     |
| Mar.   | .79               | .66  | 3                              | 3.9   | 31                               | 1.1             | 2.1       | 121     | 520     |
| Apr.   | 4.04              | .66  | 23                             | 848   | ! 18                             | .4              | 12.0      | 722     | 1,292   |
| May    | 1.15              | .66  | 1                              | 13.1  | ! 9                              | 1.1             | 1.8       | 116     | 2,003   |
| June   | 4.30              | .62  | 16                             | 1,010 | ! 16                             | 1.1             | 30.7      | 1,833   | 3,542   |
| July   | .72               | .66  | ! 1                            | 2.1   | ! 11                             | 1.4             | 1.8       | 98.9    | 1,512   |
| Aug.   | 1.02              | .66  | 30                             | 7.8   | ! 25                             | 1.1             | 2.5       | 161     | 1,660   |
| Sept.  | 2.53              | .82  | 8                              | 224   | ! 4                              | 4.9             | 11.7      | 684     | 2,242   |
| Oct.   | 2.17              | .95  | 13                             | 115   | ! 4                              | 7.4             | 16.2      | 993     | 1,012   |
| Nov.   | 1.35              | 1.25 | 19                             | 17.7  | ! 9                              | 14.8            | 16.2      | 961     | 505     |
| Dec.   | 1.35              | 1.28 | ! 29                           | 19.4  | ! 1                              | 15.2            | 17.7      | 1,075   | 572     |
|        | 4.30              |      |                                | 1,010 |                                  | 0               | 9.5       | 6,888.9 | 15,987  |
| Yearly | <b>Meters</b>     |      | <b>Cubic Meters per Second</b> |       | <b>Thousands of Cubic Meters</b> |                 |           |         |         |
|        | 1.31              |      | 28.6                           |       | 0                                | 0.27            | 8,495     | 19,717  | 94,066  |
|        |                   |      |                                |       |                                  |                 |           |         | 1,170   |

\* Discharge measurement made on this day ! And other days

### RIO SAN DIEGO NEAR JIMENEZ, COAHUILA

**DESCRIPTION:** Cableway, masonry and concrete Cipolletti weir of 777 second-foot (22 m<sup>3</sup>/sec) capacity, gravity well, and water-stage recorder located on the left bank of Rio San Diego, and gravity well and water-stage recorder on Acequia de Dolores, an irrigation canal that runs along the left bank of the river under the cable, and located at latitude 29°04'20", longitude 100°47'35", about 3.5 miles (6 km) west of Jimenez, Coahuila, and 4.1 river miles (7 km) from the confluence with the Rio Grande. Part of the canal flow measured here returns to the river downstream. This stream enters the Rio Grande at river mile 532.2 (856.4 km), 10.4 river miles (16.8 km) downstream from Maverick County Water Control and Improvement District No. 1 diversion dam and 28.9 (46.4 km) downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 831.73 feet (253.51 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** For the river, based on the weir discharge table and a continuous record of gage heights; and for the canal, on 12 discharge measurements during the year and a continuous record of gage heights. The flow tabulated below includes the flow of the canal, and prior to 1964, records do not include this flow. During 1981 the flow was within the capacity of the weir practically all year. Records available: 1922 through 1981. The records from 1922 through September 1932 are considered doubtful.

**REMARKS:** Reservoirs and irrigation diversions upstream from these stations modify the flow of this spring-fed stream. On December 24, 1955, the zero of the gage was raised 2.62 feet (0.80 m); in November 1961 an additional 0.20 foot (0.06 m), and the capacity of the weir was increased from 706 (20 m<sup>3</sup>/sec) to 777 second-feet (22 m<sup>3</sup>/sec).

**EXTREME FLOWS FROM RECORDS\*\*:** Momentary: Max. 81,930 second-feet (2,320 m<sup>3</sup>/sec) on June 17, 1961 with a gage height of 20.70 feet (6.31 m). Min. no flow occurred on several occasions during April, May, and June 1939, May and August 1952, and July and August 1953.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          | Daily             | Min. 0        | Occasionally     |
|----------|-------------------|---------------|------------------|
| Max.     | 36,700 (1,040)    | July 18, 1975 | Min. 8.0 (0.23)  |
| Monthly: | Max. 2,380 (67.5) | Oct. 1932     | July 1956        |
| Yearly:  | Max. 622 (17.6)   | 1976          | Min. 24.0 (0.68) |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.  | March    | April   | May    | June   | July   | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|-------|----------|---------|--------|--------|--------|-------|-------|-------|-------|-------|
| 1          | 350   | 173   | 116      | 118     | 996    | 590    | 537    | 280   | 230   | 213   | 290   | 159   |
| 2          | 350   | 182   | 116      | 118     | 1,050  | 562    | 537    | 280   | 247   | 195   | 290   | 159   |
| 3          | 350   | 205   | 130      | 118     | 1,050  | 562    | 523    | 282   | 229   | 178   | 301   | 159   |
| 4          | 336   | 213   | 124      | 118 *   | 1,050  | 562    | 512    | 281   | 220   | 171   | 313   | 137   |
| 5          | 336   | 222   | 124      | 118     | 1,030  | 576    | 512    | 279   | 220   | 162   | 313   | 137   |
| 6          | 313   | 222   | 137      | 118     | 996    | 565    | 512    | 279   | 220   | 216   | 281   | 145   |
| 7          | 301   | 189   | 137      | 118     | 996    | 537    | 526    | 279   | 220   | 353   | 266   | 174   |
| 8          | 277   | 181   | 137      | 111     | 975    | 537    | 470    | 279   | 212   | 328   | 274   | 182   |
| 9          | 255 * | 173   | 137      | 98.2    | 975    | 484    | 431    | 268   | 229   | 316   | 244   | 182   |
| 10         | 245   | 158   | 137 *    | 98.2    | 975    | 484    | 431    | 265   | 229   | 316   | 211 * | 182   |
| 11         | 245   | 151   | 144      | 91.8    | 968    | 484    | 417    | 258   | 249   | 305   | 208   | 174   |
| 12         | 245   | 144   | 152      | 85.8    | 964    | 484    | 403    | 258   | 259   | 295   | 208   | 174   |
| 13         | 234   | 144   | 152      | 79.5    | 957    | 484    | 403    | 258   | 259   | 505   | 200   | 174   |
| 14         | 224   | 143   | 152      | 71.0    | 950    | 484    | 388    | 258   | 269   | 281   | 200   | 174   |
| 15         | 206   | 129   | 152      | 724     | 950    | 484    | 388    | 258   | 259   | 271   | 200   | 174   |
| 16         | 198   | 123 * | 145      | 224     | 932    | 1,580  | 388 *  | 258   | 249   | 305   | 208   | 174   |
| 17         | 206   | 117   | 131      | 523     | 932    | 784    | 388    | 268   | 260   | 271   | 197   | 174   |
| 18         | 206   | 117   | 131      | 855     | 911    | 678    | 388    | 272   | 260   | 270   | 208   | 174   |
| 19         | 206   | 116   | 152      | 855     | 890 *  | 613    | 378    | 279   | 260   | 280   | 205   | 174   |
| 20         | 245   | 129   | 145      | 936     | 872    | 622    | 378    | 274   | 260   | 280   | 200   | 174   |
| 21         | 255   | 129   | 145      | 936     | 858    | 622    | 364    | 269   | 280 * | 279   | 200   | 174   |
| 22         | 255   | 129   | 138      | 975     | 826    | 593    | 328    | 268   | 270   | 301   | 200   | 150   |
| 23         | 255   | 129   | 152      | 2,180 * | 809    | 593 *  | 315    | 259   | 270   | 303   | 200   | 138   |
| 24         | 255   | 129   | 167      | 1,110   | 795    | 565    | 315    | 256   | 260   | 303   | 196   | 138   |
| 25         | 255   | 123   | 167      | 1,010   | 759    | 565    | 303    | 238 * | 260   | 302   | 191   | 135   |
| 26         | 255   | 116   | 167      | 996     | 759    | 565    | 303    | 228   | 260   | 302   | 191   | 131   |
| 27         | 245   | 116   | 152      | 1,010   | 710    | 565    | 303    | 220   | 260   | 302   | 183   | 131   |
| 28         | 245   | 116   | 145      | 1,010   | 678    | 565    | 303    | 220   | 244   | 290 * | 176   | 118   |
| 29         | 209   | 138   | 1,010    | 664     | 565    | 292    | 220    | 220   | 220   | 290   | 168   | 118   |
| 30         | 181   | 124   | 996      | 664     | 565    | 280    | 220    | 220   | 302   | 302   | 155   | 105   |
| 31         | 173   | 118   | 664      | 280     | 219    | 155    | 155    | 290   | 290   | 290   | 155   | 105   |
| <b>Sum</b> | 4,218 | 7,911 | 16,211.5 | 4,364   | 27,605 | 17,949 | 12,296 | 8,021 | 7,394 | 8,741 | 6,669 | 4,812 |

**Current Year 1981**

**Period 1933-1981**

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |         |         |  |  |
|---------------|-------------------|------|-----|--------------------------------|------|---------------------|----------------------------------|-----------|---------|---------|--|--|
|               | High              |      | Low | High                           |      |                     |                                  | Average   | Maximum | Minimum |  |  |
|               | High              | Low  |     | Day                            | Day  |                     |                                  |           |         |         |  |  |
| Jan.          | 0.82              | 0.52 | ! 1 | 350                            | 31   | 173                 | 255                              | 15,684    | 8,213   | 36,430  |  |  |
| Feb.          | .59               | .36  | ! 5 | 222                            | 119  | 116                 | 151                              | 8,368     | 6,326   | 25,760  |  |  |
| Mar.          | .49               | .36  | 123 | 174                            | ! 1  | 116                 | 141                              | 8,654     | 5,548   | 27,040  |  |  |
| Apr.          | 4.00              | .23  | 23  | 5,120                          | 114  | 66.0                | 540                              | 32,167    | 6,979   | 40,270  |  |  |
| May           | 1.54              | 1.18 | ! 2 | 1,050                          | 129  | 664                 | 890                              | 54,747    | 12,128  | 120,200 |  |  |
| June          | 2.99              | .95  | 16  | 3,170                          | ! 9  | 484                 | 597                              | 35,597    | 11,459  | 108,300 |  |  |
| July          | 1.02              | .69  | ! 1 | 537                            | ! 30 | 280                 | 396                              | 24,389    | 13,708  | 136,149 |  |  |
| Aug.          | .72               | .59  | 19  | 291                            | 31   | 219                 | 259                              | 15,907    | 11,783  | 91,248  |  |  |
| Sept.         | .72               | .56  | 121 | 305                            | ! 7  | 212                 | 246                              | 14,654    | 17,099  | 94,667  |  |  |
| Oct.          | 1.57              | .46  | 13  | 1,090                          | 5    | 155                 | 282                              | 17,336    | 18,643  | 71,830  |  |  |
| Nov.          | .75               | .46  | ! 4 | 328                            | 30   | 153                 | 222                              | 13,230    | 13,181  | 64,060  |  |  |
| Dec.          | .52               | .36  | ! 8 | 190                            | ! 30 | 105                 | 155                              | 9,543     | 9,340   | 45,320  |  |  |
|               | 4.00              | 0.23 |     | 5,120                          |      | 66.0                | 346                              | 250,276   | 134,497 | 451,952 |  |  |
| <b>Yearly</b> | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |      |                     | <b>Thousands of Cubic Meters</b> |           |         |         |  |  |
|               | 1.22              | 0.07 |     | 145                            |      | 1.87                | 9.79                             | 308,712   | 165,900 | 557,477 |  |  |

\*\* Period October 1932-1981 \* Discharge measurement made on this day ! And other days

**RIO GRANDE NEAR JIMENEZ, COAHUILA AND QUEMADO, TEXAS**

**DESCRIPTION:** Cableway, bubbler gage, control weir of 1,270 second-foot (36 m<sup>3</sup>/sec) capacity, gravity well, and water-stage recorder located on the right bank at latitude 29°03'00", longitude 100°39'50", and river mile 530.3 (853.5 km); 1.5 miles (2.4 km) south-southeast of Jimenez, Coahuila, 1.8 river miles (3.0 km) downstream from Rio San Diego, about 7.5 miles (12.1 km) north-northwest of Quemado, Maverick County, Texas, 12.3 river miles (19.8 km) downstream from the Maverick County Water Control and Improvement District No. 1 diversion dam, and 30.7 river miles (49.4 km) downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 769.00 feet (234.39 m) above mean sea level, U.S.C. & G.S. datum.

**RECORDS:** Based on 12 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods prior to completion of the weir and for flows exceeding the capacity of the weir thereafter. Computations for flows within the capacity of the weir were based on a stable control weir rating curve defined by meter measurements. Records available: 1965 through 1981. Records, excluding some high flow periods, are also available from 1956 through May 1965 for a station 8.1 river miles (14 km) upstream. Records prior to 1976 were published under the title "Rio Grande below Maverick Dam near Quemado, Texas."

**REMARKS:** This station was placed in operation January 1, 1965 and replaces the station "Rio Grande below Maverick Dam near Del Rio, Texas," which stopped operating June 1, 1965. Irrigation diversions 13.3 river miles (21.5 km) upstream largely control the flow at this station. The weir was placed in operation June 1, 1967, and the zero of the gage was set 3.28 feet (1 m) higher.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 79,800 second-feet (2,260 m<sup>3</sup>/sec) on July 18, 1975 with a gage height of 25.20 feet (7.68 m). Min. 3.5 second-feet (0.10 m<sup>3</sup>/sec) on March 9, 1969 with a gage height of 0.16 foot (0.05 m).

**Average Flow in Second-Feet (Cubic Meters per Second)**

|          |                     |               |                  |                           |
|----------|---------------------|---------------|------------------|---------------------------|
| Daily:   | Max. 67,100 (1,900) | July 18, 1975 | Min. 7.1 (0.20)  | July 16, 17, and 18, 1969 |
| Monthly: | Max. 21,300 (602)   | Sept. 1974    | Min. 28.3 (0.80) | June 1969                 |
| Yearly:  | Max. 4,380 (124)    | 1974          | Min. 286 (8.11)  | 1968                      |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day           | Jan.  | Feb.  | March         | April         | May           | June           | July           | Aug.          | Sept.   | Oct.    | Nov.   | Dec.    |
|---------------|-------|-------|---------------|---------------|---------------|----------------|----------------|---------------|---------|---------|--------|---------|
| 1             | 922   | 682   | 388           | 392           | 1,180         | 653            | 2,260          | 374           | 989     | 1,180   | 876    | 735     |
| 2             | 918   | 667   | 378           | 773           | 1,020         | 667            | 2,230          | 396           | 1,010   | 282     | 876    | 689     |
| 3             | 918   | 653   | 411           | 943           | 1,110         | 653            | 2,190          | 367           | 2,230   | 252     | 876    | 600     |
| 4             | 908   | 682   | 424           | 879           | 1,040         | 675            | 2,190          | 353           | 2,990   | 239     | 848    | 583     |
| 5             | 897   | 696   | 399           | 929           | 989           | 1,910          | 2,220          | 333           | 3,030   | 231     | 855    | 579     |
| 6             | 915   | 696   | 413           | 946           | 1,360         | 1,470          | 2,240          | 304           | 2,700   | 2,620   | 823    | 586     |
| 7             | 886   | 667   | 424           | 957           | 1,920         | 1,170          | 2,300          | 319           | 3,810   | 1,670   | 819    | 646     |
| 8             | 855   | 667   | 438           | 858           | 1,950         | 1,200          | 2,270          | 572           | 3,850   | 501     | 833    | 614     |
| 9             | 840   | 653   | 413           | 848           | 1,870         | 1,080          | 2,250          | 593           | 1,700   | 551     | 798    | 607     |
| 10            | 802   | 653   | 424 *         | 837           | 1,870         | 1,080          | 1,690          | 526           | 2,680   | 533     | 749    | 607     |
| 11            | 795   | 632   | 452           | 823           | 1,370         | 1,060          | 1,540          | 516           | 3,050   | 526     | 759    | 607     |
| 12            | 766   | 611   | 505           | 812           | 946           | 1,600          | 1,510          | 505           | 3,090   | 9,390   | 773    | 607     |
| 13            | 773 * | 611   | 487           | 798           | 911           | 1,700          | 1,430          | 501           | 3,090   | 12,100  | 802    | 593     |
| 14            | 784   | 533   | 487           | 862           | 911           | 1,670          | 1,410          | 498           | 3,500   | 11,800  | 844    | 604     |
| 15            | 735   | 463   | 501           | 1,670         | 893           | 1,640          | 1,310          | 844           | 6,500 * | 11,800  | 837    | 583     |
| 16            | 706   | 448   | 473           | 2,610         | 936           | 6,530          | 788            | 992           | 6,600   | 11,200  | 837    | 586     |
| 17            | 431   | 364 * | 473           | 2,990         | 1,010         | 3,330          | 1,370          | 1,030         | 6,530   | 5,760   | 830    | 590     |
| 18            | 340   | 413   | 501           | 4,700         | 968           | 2,790          | 1,360          | 2,580         | 6,530   | 5,510   | 833    | 565     |
| 19            | 667   | 424   | 473           | 3,440         | 858 *         | 2,780          | 1,340          | 4,980         | 6,530   | 5,580   | 837    | 579     |
| 20            | 749   | 406   | 473           | 3,160         | 809           | 2,500          | 1,320 *        | 5,260         | 6,530   | 6,140 * | 805    | 590     |
| 21            | 759   | 378   | 516           | 3,190 *       | 819           | 2,460          | 1,300          | 5,230         | 6,530   | 6,140   | 802    | 590     |
| 22            | 777   | 388   | 498           | 3,220         | 770           | 2,420          | 936            | 6,530         | 6,320   | 805     | 607    | 590     |
| 23            | 759   | 378   | 463           | 7,060         | 819           | 2,380          | 759            | 6,750         | 6,320   | 819 *   | 343    | 222     |
| 24            | 759   | 353   | 413           | 4,730         | 809           | 2,340          | 569            | 6,780         | 4,770   | 6,320   | 777    | 210     |
| 25            | 742   | 318   | 413           | 3,500         | 819           | 2,340          | 540            | 3,010         | 4,730   | 6,290   | 784    | 210     |
| 26            | 742   | 318   | 413           | 3,320         | 735           | 2,110          | 516            | 463 *         | 4,730   | 6,110   | 816    | 210     |
| 27            | 759   | 333   | 413           | 3,270         | 682           | 2,440          | 569            | 558           | 4,730   | 3,640   | 812    | 210     |
| 28            | 759   | 367   | 424           | 3,240         | 682           | 2,300          | 562            | 586           | 4,770   | 1,110   | 763    | 205     |
| 29            | 696   | 452   | 1,330         | 682           | 2,300 *       | 516            | 802            | 3,290         | 1,110   | 876     | 773    | 173     |
| 30            | 682   | 406   | 996           | 667           | 2,260         | 431            | 1,170          | 6,070         | 858     | 1,190   | 158    | 158     |
| 31            | 682   | 388   | 710           | 1,270         | 158           | 364            | 1,200          | 42,559        | 890     | 181,109 | 15,236 | 207,998 |
| <b>Sum</b>    |       |       | <b>14,454</b> | <b>64,083</b> | <b>59,808</b> | <b>54,922</b>  | <b>132,739</b> | <b>24,851</b> |         |         |        |         |
| <b>23,723</b> |       |       | <b>13,766</b> | <b>32,115</b> | <b>42,280</b> | <b>128,709</b> | <b>24,851</b>  |               |         |         |        |         |

**Current Year 1981**

| Month         | Extreme Gage Feet |      |               | Extreme Second-Feet |       | Average Second-Feet            | Total Acre-Feet | Acre-Feet |                                  |           |         |  |
|---------------|-------------------|------|---------------|---------------------|-------|--------------------------------|-----------------|-----------|----------------------------------|-----------|---------|--|
|               | High              |      | Low           | High                |       |                                |                 | Average   | Maximum                          | Minimum   |         |  |
|               | High              | Low  |               | Day                 | Day   |                                |                 |           |                                  |           |         |  |
| Jan.          | 1.44              | 0.72 | 6             | 989                 | 1! 17 | 766                            | 47,051          | 38,652    | 144,286                          | 5,236     |         |  |
| Feb.          | 1.18              | .69  | 4             | 710                 | 125   | 318                            | 28,672          | 77,686    | 401,339                          | 5,788     |         |  |
| Mar.          | .95               | .75  | 12            | 526                 | 2     | 364                            | 445             | 27,310    | 77,704                           | 5,874     |         |  |
| Apr.          | 6.43              | .75  | 23            | 13,700              | 1     | 364                            | 2,140           | 127,146   | 57,235                           | 5,030     |         |  |
| May           | 2.20              | 1.08 | 8             | 2,340               | 30    | 622                            | 1,030           | 63,685    | 132,373                          | 422,934   |         |  |
| June          | 6.50              | 1.08 | 16            | 13,900              | ! 1   | 622                            | 2,000           | 118,671   | 93,756                           | 1,671     |         |  |
| July          | 2.20              | .72  | 8             | 2,340               | 31    | 340                            | 1,360           | 83,858    | 105,760                          | 311,781   |         |  |
| Aug.          | 3.97              | .62  | 123           | 6,780               | 7     | 285                            | 1,770           | 108,939   | 130,362                          | 2,322     |         |  |
| Sept.         | 3.94              | .75  | 16            | 6,670               | 3     | 364                            | 4,310           | 255,329   | 194,101                          | 11,855    |         |  |
| Oct.          | 6.23              | .56  | 13            | 13,100              | 1 4   | 231                            | 4,270           | 263,137   | 156,858                          | 831,298   |         |  |
| Nov.          | 1.77              | 1.18 | 30            | 1,460               | 10    | 710                            | 826             | 49,298    | 77,780                           | 499,143   |         |  |
| Dec.          | 1.64              | .43  | 1             | 1,270               | 130   | 158                            | 491             | 30,226    | 42,559                           | 181,109   |         |  |
|               | 6.50              | 0.43 |               | 13,900              |       | 158                            | 1,660           | 1,203,322 | 1,184,826                        | 3,169,805 | 207,998 |  |
| <b>Yearly</b> |                   |      | <b>Meters</b> |                     |       | <b>Cubic Meters per Second</b> |                 |           | <b>Thousands of Cubic Meters</b> |           |         |  |
|               | 1.98              | 0.13 |               | 393                 |       | 4,47                           | 47.1            | 1,484,282 | 1,461,466                        | 3,909,913 | 256,561 |  |

\* Discharge measurement made on this day      ! And other days

## RIO SAN RODRIGO AT EL MORAL, COAHUILA

**DESCRIPTION:** Gravity well and water-stage recorder located on the left bank of El Moral, Coahuila, latitude 28°53'20", longitude 100°37'55", 1.0 river mile (1.6 km) from the confluence with the Rio Grande, and about 15.5 miles (25 km) northwest of Piedras Negras, Coahuila. This stream enters the Rio Grande at river mile 518.2 (834.0 km), 24.4 river miles (39.3 km) downstream from the Maverick County Water Control and Improvement District No. 1 diversion dam and 21.9 river miles (35.2 km) upstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. The zero of the gage is 750.95 feet (228.89 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 21 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1962 through 1981.

**REMARKS:** Prior to 1976 this station was published under the heading "Rio San Rodrigo near Mouth at El Moral, Coahuila." The flow of this spring-fed stream is modified by diversions above this station. The concrete control weir, placed in operation on November 25, 1969, was destroyed by the flood of July 12, 1976, and the station was relocated on October 15, 1976.

**EXTREME FLOWS FROM RECORDS\*\*:** Momentary: Max. 140,000 second-feet (3,970 m<sup>3</sup>/sec) on July 18, 1975 with a gage height of 18.44 feet (5.62 m). Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                     |               |                 |            |
|----------|---------------------|---------------|-----------------|------------|
| Daily:   | Max. 44,500 (1,260) | July 18, 1975 | Min. 0          | Frequently |
| Monthly: | Max. 7,380 (209)    | July 1976     | Min. 0          | Frequently |
| Yearly:  | Max. 837 (23.7)     | 1976          | Min. 5.3 (0.15) | 1963       |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.           | Feb. | March           | April | May           | June  | July           | Aug. | Sept.          | Oct. | Nov.           | Dec.   |      |  |
|------------|----------------|------|-----------------|-------|---------------|-------|----------------|------|----------------|------|----------------|--------|------|--|
| 1          | 56.5           | 31.4 | 31.4            | 12.0  | 749           | 179   | 155            | 91.1 | 33.9           | 49.4 | 49.4           | 40.6   |      |  |
| 2          | 56.5           | 31.4 | 9.5             | 953   | 179           | 149   | 84.4           | 75.6 | 49.4           | 49.4 | 40.6           |        |      |  |
| 3          | 56.5           | 31.4 | 35.0            | 8.5   | 1,300         | 174   | 139            | 79.8 | 95.3           | 49.4 | 49.4           | 40.6   |      |  |
| 4          | 56.5           | 31.4 | 40.6            | 8.1   | 1,270         | 174   | 135            | 75.6 | *              | 49.4 | 49.4           | 40.6   |      |  |
| 5          | 53.0           | 33.9 | 36.4            | 7.4   | 1,030         | 169   | 135            | 68.2 | 59.3           | 49.4 | 49.4           | 40.6   |      |  |
| 6          | 49.4           | 33.9 | 33.9            | 7.4   | 915           | 169   | 144            | 65.3 | 55.1           | 55.4 | 49.4           | 40.6   |      |  |
| 7          | 49.4           | 33.9 | 33.9            | 7.4   | 833           | 169   | 149            | *    | 63.6           | 51.6 | 60.7           | 49.4   | 38.8 |  |
| 8          | * 49.4         | 31.4 | 33.9            | 7.4   | 749           | 165   | *              | 144  | 69.2           | 48.0 | 65.3           | 49.4   | 38.8 |  |
| 9          | 49.4           | 29.0 | * 31.4          | 7.4   | 632           | 155   | 136            | 65.3 | 58.3           | *    | 60.7           | 60.7   | 38.8 |  |
| 10         | 45.9           | 29.0 | 31.4            | 8.5   | 554           | 149   | 128            | 57.9 | 67.1           | 56.5 | *              | 60.7   | 38.8 |  |
| 11         | 45.9           | 29.0 | 33.9            | 8.1   | 491           | 144   | 124            | *    | 56.5           | 56.5 | 56.5           | 60.7   | 38.8 |  |
| 12         | 42.4           | 29.0 | 40.6            | 8.1   | 441 *         | 149   | 120            | 56.5 | 53.0           | 56.5 | 58.6           | 38.8   |      |  |
| 13         | 38.8           | 29.0 | 40.6            | 8.1   | 403           | 139   | 120            | 51.6 | 53.0           | 56.5 | 49.4           | 36.4   |      |  |
| 14         | 38.8           | 29.0 | 36.4            | 9.5   | 367           | 135   | 116            | 49.4 | 53.0           | 65.3 | 49.4           | * 36.4 |      |  |
| 15         | 33.9           | 29.0 | 33.9            | 31.8  | 347           | 130   | 113            | 53.0 | 51.6           | 60.7 | 49.4           | 36.4   |      |  |
| 16         | 33.9           | 26.8 | 31.4            | 31.4  | 323           | 456   | 110 *          | 53.0 | 49.4           | 56.5 | 49.4           | 36.4   |      |  |
| 17         | 33.9           | 24.7 | 29.0            | 29.3  | 294           | 374   | 108            | 53.0 | 49.4           | 56.5 | 49.4           | 36.4   |      |  |
| 18         | 38.8           | 24.7 | 29.0            | 720   | 267           | 360   | 100            | 51.6 | 49.4           | 56.5 | 49.4           | 33.9   |      |  |
| 19         | 45.9           | 24.7 | 24.7            | 1,340 | 240           | 346   | 95.3           | 41.0 | 49.4           | 53.0 | 45.9           | 33.9   |      |  |
| 20         | 42.4           | 24.7 | 22.6            | 936   | 230           | 296   | 91.8           | 39.6 | 49.4           | 49.4 | 45.9           | 33.9   |      |  |
| 21         | 40.6           | 26.8 | 22.6            | 1,030 | 214           | 254   | 91.8           | 38.1 | 49.4           | 49.4 | 45.9           | 33.9   |      |  |
| 22         | 38.8           | 29.0 | 22.6            | 1,240 | 208           | 224 * | 91.8           | 36.4 | 49.4           | 49.4 | 45.9           | * 33.9 |      |  |
| 23         | 38.8           | 31.4 | 20.8            | 1,790 | 201           | 205   | 91.1           | 35.3 | 49.4           | 49.4 | 45.9           | 31.4   |      |  |
| 24         | 36.4           | 31.4 | * 20.8          | 1,910 | 190           | 195   | 84.4           | 33.9 | 49.4           | 49.4 | 42.4           | 31.4   |      |  |
| 25         | 36.4           | 31.4 | 20.8            | 1,320 | 282           | 189   | 81.2           | 32.8 | 49.4           | 49.4 | 42.4           | 31.4   |      |  |
| 26         | 33.9           | 31.4 | 19.4            | 929   | 249           | 179   | 83.3           | *    | 31.4           | 49.4 | 49.4           | 31.4   |      |  |
| 27         | 33.9           | 31.4 | 19.4            | 964   | 219           | 179   | 93.2           | *    | 29.0           | 49.4 | 49.4           | 31.4   |      |  |
| 28         | 33.9           | 29.0 | 17.7            | 872   | 208           | 169   | 84.8           | 29.0 | 49.4           | 49.4 | 40.6           | 31.4   |      |  |
| 29         | *              | 31.4 | 13.8            | 738   | 205 *         | 166   | 91.1           | 30.7 | *              | 49.4 | 49.4           | 40.6   | 29.0 |  |
| 30         | 31.4           |      | 12.7            | 657   | 201           | 160   | 98.9           | 33.9 | 49.4           | 49.4 | 40.6           | 29.0   |      |  |
| 31         | 31.4           |      | 12.7            |       | 195           |       | 96.1           | 33.9 |                | 49.4 | 49.4           | 29.0   |      |  |
| <b>Sum</b> | <b>829.1</b>   |      | <b>14,655.9</b> |       | <b>6,131</b>  |       | <b>1,590.0</b> |      | <b>1,656.4</b> |      | <b>1,100.9</b> |        |      |  |
|            | <b>1,304.1</b> |      | <b>864.7</b>    |       | <b>14,760</b> |       | <b>3,499.8</b> |      | <b>1,621.9</b> |      | <b>1,447.9</b> |        |      |  |

### Current Year 1981

| Month  | Extreme Gage Feet |      |     | Extreme Second-Feet     |      | Average Second-Feet | Period 1962-1981          |         |         |  |
|--------|-------------------|------|-----|-------------------------|------|---------------------|---------------------------|---------|---------|--|
|        | High              |      | Day | High                    |      |                     | Acre-Feet                 |         |         |  |
|        | High              | Low  | Day | Day                     | Low  |                     | Average                   | Maximum | Minimum |  |
| Jan.   | 2.26              | 2.10 | 1 1 | 56.5                    | 29   | 29.0                | 42.0                      | 2,588   | 3,604   |  |
| Feb.   | 2.13              | 2.07 | 1 5 | 33.9                    | 117  | 24.7                | 29.7                      | 1,645   | 9,932   |  |
| Mar.   | 2.20              | 1.94 | 4   | 42.4                    | 130  | 12.7                | 27.9                      | 1,715   | 7,818   |  |
| Apr.   | 7.35              | 1.80 | 23  | 5,440                   | 1 5  | 7.4                 | 487                       | 29,072  | 29,072  |  |
| May    | 4.89              | 2.72 | 3   | 1,450                   | 31   | 189                 | 477                       | 29,277  | 4,319   |  |
| June   | 3.87              | 2.53 | 16  | 657                     | 15   | 130                 | 204                       | 12,157  | 2,622   |  |
| July   | 2.59              | 2.33 | 1 1 | 155                     | 28   | 74.2                | 113                       | 6,943   | 12,764  |  |
| Aug.   | 2.43              | 2.10 | 8   | 101                     | 127  | 29.0                | 51.2                      | 36,829  | 454,643 |  |
| Sept.  | 2.46              | 2.13 | 2   | 110                     | 1 1  | 33.9                | 54.0                      | 13,246  | 89,017  |  |
| Oct.   | 2.30              | 2.23 | 1 8 | 65.3                    | 1 1  | 49.4                | 53.3                      | 3,218   | 15,857  |  |
| Nov.   | 2.30              | 2.17 | 9   | 65.3                    | 126  | 40.6                | 48.4                      | 2,873   | 48,065  |  |
| Dec.   | 2.17              | 2.10 | 1   | 40.6                    | 128  | 29.0                | 35.7                      | 2,184   | 53,088  |  |
|        | 7.35              | 1.80 |     | 5,440                   | 7.4  | 136                 | 98,113                    | 113,139 | 5,151   |  |
| Yearly | Meters            |      |     | Cubic Meters per Second |      |                     | Thousands of Cubic Meters |         |         |  |
|        | 2.24              | 0.55 |     | 154                     | 0.21 | 3.84                | 121,021                   | 139,557 | 748,140 |  |
|        |                   |      |     |                         |      |                     |                           |         | 4,750   |  |

\*\* Period 1961-1981

\* Discharge measurement made on this day

! And other days

**RETURN FLOW TO THE RIO GRANDE FROM THE MAVERICK CANAL  
AT MAVERICK POWER PLANT NEAR EAGLE PASS, TEXAS**

**DESCRIPTION:** A part of the water diverted from the river into the Maverick Canal is returned to the Rio Grande through the hydroelectric power plant located on the left bank of the Rio Grande at latitude 28°49'50", longitude 100°33'10", about 9 miles (14.5 km) north-northwest of Eagle Pass, Texas, and about 32.2 canal miles (51.8 km) downstream from the point of diversion. The return enters the Rio Grande at river mile 506.8 (815.6 km).

**RECORDS:** Based on records furnished by the Maverick County Water Control and Improvement District No. 1, showing hourly discharge in cubic feet per second based on hourly manometer readings, through each turbine at the Central Power and Light Company hydroelectric power plant. The mean daily discharges computed from the manometer readings have been multiplied by a factor to make them agree with periodic current meter measurements of flows made under stable flow conditions by hydrographers of the Commission. There were 48 discharge measurements made during the year. Records available: 1949 through 1981.

**REMARKS:** This power plant began operating April 16, 1932 with hydroelectric power generating facilities for 12,000 kw. Because the September 1932 flood washed out the upper end of the Maverick Canal, this plant did not operate from September 2, 1932 until March 17, 1937. Since then it has operated continuously except for 44 days in 1953 when shortage of water prevented operation, and from June 30 through July 19 during flood of 1954, and while the canal was being repaired. The plant's operation is now governed by the amount of water released from Amistad Reservoir, which began operations on May 31, 1968.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                   |                    |                  |               |
|----------|-------------------|--------------------|------------------|---------------|
| Daily:   | Max. 1,570 (44.5) | Dec. 16 & 17, 1980 | Min. 0           | Occasionally  |
| Monthly: | Max. 1,480 (41.9) | Dec. 1980          | Min. 42.4 (1.20) | December 1971 |
| Yearly:  | Max. 1,230 (34.8) | 1981               | Min. 232 (6.57)  | 1972          |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.    | March    | April   | May     | June    | July    | Aug.    | Sept.         | Oct.    | Nov.    | Dec.   |
|------------|---------|---------|----------|---------|---------|---------|---------|---------|---------------|---------|---------|--------|
| 1          | 1,380   | 1,460   | 1,360    | 1,090   | 1,090   | 727 *   | 1,410   | 572     | * 1,210       | 1,230   | 1,380   | 1,150* |
| 2          | 1,390   | 1,460   | 1,310*   | 1,120   | 1,120   | 627     | 1,390   | 541     | 1,010         | 1,100   | 1,300   | 1,230  |
| 3          | 1,320   | 1,460 * | 1,310    | 1,130   | 1,230   | 647     | 1,380   | 520 *   | 952           | 1,030   | 1,300   | 1,260  |
| 4          | 1,380   | 1,480   | 1,310    | 1,150   | 1,050 * | 682     | 1,360   | 457     | 1,330         | 1,020   | 1,310   | 1,290  |
| 5          | 1,300 * | 1,500   | 1,260    | 1,180   | 1,010   | 1,140   | 1,330   | 533     | 1,370 * 1,010 | 1,320   | 1,310   | 1,310  |
| 6          | 1,280   | 1,490   | 1,250    | 1,170 * | 721     | 1,390   | 1,330 * | 399     | 1,350         | 1,040   | 1,320   | 1,370  |
| 7          | 1,320   | 1,480   | 1,280    | 1,160   | 86.0    | 1,470   | 1,370 * | 701     | 1,380         | 1,250   | 1,290   | 1,300* |
| 8          | 1,350   | 1,480   | 1,310    | 1,120   | 0       | 1,410 * | 1,340   | 967     | 1,400         | 1,420   | 1,350   | 1,290  |
| 9          | 1,340   | 1,490 * | 1,270 *  | 1,130   | 0       | 1,390   | 1,320   | 2,120   | 1,380         | 1,440   | 1,300 * | 1,310  |
| 10         | 1,370   | 1,490   | 1,260    | 1,210   | 0       | 1,400   | 1,290   | 1,140 * | 1,400         | 1,440   | 1,260   | 1,330  |
| 11         | 1,370   | 1,460   | 1,330    | 1,240   | 0       | 1,360   | 1,280   | 1,140   | * 1,400       | 1,440   | 1,230   | 1,340  |
| 12         | 1,340   | 1,460   | 1,430    | 1,270   | 310     | 1,390   | 1,290   | 1,100   | 1,430         | 1,380   | 1,250   | 1,300  |
| 13         | 1,400 * | 1,470   | 1,470    | 1,240 * | 651     | 1,360   | 1,230   | 1,110   | 1,440         | 1,390   | 1,270   | 1,320  |
| 14         | 1,390   | 1,440   | 1,480    | 1,310   | 638     | 1,350   | 1,170   | 1,130   | * 1,410       | 1,380   | 1,270   | 1,330* |
| 15         | 1,370   | 1,390   | 1,470    | 1,450   | 620     | 1,330   | 1,160   | 1,150   | 1,330         | 1,340   | 1,280   | 1,330  |
| 16         | 1,370   | 1,400   | 1,430    | 1,470   | 699     | 1,450   | 968 *   | 1,200   | 1,330         | 1,360   | 1,260 * | 1,330  |
| 17         | 1,390   | 1,360 * | 1,370 *  | 1,430   | 1,060   | 1,400 * | 1,090   | 1,090 * | 1,270         | 1,340   | 1,230   | 1,340  |
| 18         | 1,400   | 1,380   | 1,350    | 1,470   | 1,070 * | 1,440   | 1,110   | 1,110   | 1,360         | 1,400   | 1,220   | 1,350  |
| 19         | 1,410   | 1,380   | 1,290    | 1,490   | 902     | 1,500   | 1,190   | 1,180   | 1,390         | 1,340   | 1,220   | 1,390  |
| 20         | 1,500 * | 1,370   | 1,270    | 1,480 * | 574     | 1,480   | 1,120   | 1,230   | 1,400         | 1,390   | 1,210   | 1,420  |
| 21         | 1,520   | 1,330   | 1,290    | 1,510   | 389     | 1,470   | 1,070 * | 1,240   | * 1,390       | 1,340   | 1,220   | 1,400* |
| 22         | 1,520   | 1,350   | 1,310    | 1,520   | 548     | 1,470 * | 1,050   | 1,260   | 1,310         | 1,350   | 1,210   | 1,380  |
| 23         | 1,530   | 1,330   | 1,290 *  | 1,500   | 646     | 1,510   | 1,060   | 1,310   | 1,120         | * 1,370 | 1,180 * | 1,290  |
| 24         | 1,540   | 1,290 * | 1,220    | 1,440   | 678     | 1,520   | 1,020   | 1,300 * | 1,290         | 1,390   | 1,190   | 1,310  |
| 25         | 1,510   | 1,280   | 1,130    | 1,460   | 679     | 1,460   | 1,000   | 1,240   | 1,330         | 1,400   | 1,190   | 1,360  |
| <b>Sum</b> | 39,390  | 39,680  | 39,403   | 31,680  | 40,740  |         |         |         |               |         |         | 41,050 |
|            | 43,790  | 39,830  | 19,042.0 | 36,161  | 39,612  |         |         |         |               |         |         | 37,850 |

Current Year 1981

Period 1968-1981

| Month  | Extreme Gage Feet |     | Extreme Second-Feet     |       | Average Second-Feet | Total Acre-Feet | Acre-Feet                 |           |         |
|--------|-------------------|-----|-------------------------|-------|---------------------|-----------------|---------------------------|-----------|---------|
|        |                   |     | High                    | Low   |                     |                 | Average                   | Maximum   | Minimum |
|        | High              | Low | Day                     | Day   |                     |                 | Average                   | Maximum   | Minimum |
| Jan.   |                   |     | 24                      | 1,540 | 6                   | 1,280           | 1,410                     | 86,856    | 88,247  |
| Feb.   |                   |     | 5                       | 1,500 | 125                 | 1,280           | 1,410                     | 78,130    | 84,012  |
| Mar.   |                   |     | 14                      | 1,480 | 126                 | 1,090           | 1,280                     | 79,002    | 82,455  |
| Apr.   |                   |     | 22                      | 1,520 | 1                   | 1,090           | 1,320                     | 78,704    | 85,154  |
| May    |                   |     | 3                       | 1,230 | 1 8                 | 0               | 614                       | 37,769    | 54,416  |
| June   |                   |     | 24                      | 1,520 | 2                   | 627             | 1,310                     | 78,155    | 99,340  |
| July   |                   |     | 1                       | 1,410 | 31                  | 631             | 1,170                     | 71,725    | 88,762  |
| Aug.   |                   |     | 23                      | 1,310 | 6                   | 399             | 1,020                     | 62,836    | 50,766  |
| Sept.  |                   |     | 13                      | 1,440 | 3                   | 952             | 1,320                     | 78,570    | 56,932  |
| Oct.   |                   |     | 1                       | 1,440 | 5                   | 1,010           | 1,310                     | 80,807    | 57,258  |
| Nov.   |                   |     | 20                      | 1,380 | 23                  | 1,180           | 1,260                     | 75,074    | 48,276  |
| Dec.   |                   |     |                         | 1,420 | 1                   | 1,150           | 1,320                     | 81,421    | 46,660  |
|        |                   |     |                         | 1,540 | 0                   | 1,230           | 889,049                   | 592,278   | 889,049 |
| Yearly | Meters            |     | Cubic Meters per Second |       |                     |                 | Thousands of Cubic Meters |           |         |
|        |                   |     | 43.6                    | 0     | 34.8                | 1,096,641       | 730,573                   | 1,096,641 | 207,665 |

\*\* Period 1968-1981

\* Discharge measurement made on this day

0 Mean daily

! And other days

**MAVERICK CANAL EXTENSION BELOW THE POWER PLANT  
NEAR EAGLE PASS, TEXAS**

**DESCRIPTION:** Gage well and digital water-stage recorder located on the downstream side of a wooden pile bridge at latitude 28°49'50", longitude 100°32'40", about 1 mile (1.6 km) downstream from the heading of this canal extension, about 9 miles (14.5 km) north-northwest of Eagle Pass, Texas, and about 32.8 canal miles (52.8 km) downstream from the point of diversion from the Rio Grande, which is located at river mile 543.6 (874.9 km). The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on 24 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1939 through 1981.

**REMARKS:** The main Maverick Canal divides into two branches at a point about 9 miles (14.5 km) north-northwest of Eagle Pass, Texas, and about 31.8 canal miles (51.2 km) downstream from the point at which water from the Rio Grande is diverted. One branch leads to the Maverick Power Plant and back to the Rio Grande, while the other branch forms this Maverick Canal Extension, which is used to transmit irrigation water. Irrigation from this canal extension began in June 1938. In 1981, 27,562 acres (11,162 ha) of land north and south of Eagle Pass were irrigated. A total of 36,576 acre-feet (45,116,000 m<sup>3</sup>) of water from this canal extension returned to the river through the irrigation system which extends approximately 67 canal miles (108 km) downstream.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 580 second-feet (16.4 m<sup>3</sup>) on July 25, 1964. Min. occasionally no flow.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                 |                  |                  |               |
|----------|-----------------|------------------|------------------|---------------|
| Daily:   | Max. 552 (15.6) | June 6 & 7, 1968 | Min. 0           | Feb. 23, 1975 |
| Monthly: | Max. 507 (14.9) | June 1968        | Min. 34.6 (0.98) | June 1981     |
| Yearly:  | Max. 294 (8.33) | 1972             | Min. 111 (3.13)  | 1981          |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.   | Feb.           | March  | April          | May    | June           | July  | Aug.         | Sept.  | Oct.           | Nov.  | Dec.           |
|------------|--------|----------------|--------|----------------|--------|----------------|-------|--------------|--------|----------------|-------|----------------|
| 1          | 75.2   | 55.1           | 98.2   | 200            | 19.8   | * 36.4         | 77.3  | 219          | 133 *  | 212            | 125   | 125 *          |
| 2          | 74.2   | 54.4           | 114    | 202            | 19.4   | 34.6           | 80.2  | 216          | 160    | 204            | 125 * | 136            |
| 3          | 102    | * 50.1         | 126    | 213            | 37.1   | 33.2           | 85.5  | 217 *        | 173    | 184            | 124   | 142            |
| 4          | 127    | 50.1           | 127 *  | 235            | * 66.0 | 31.1           | 96.8  | 212          | 148    | 186            | 115   | 140            |
| 5          | 128    | 35.3           | 137    | 254            | 52.6   | 30.0           | 139   | 213          | 145    | 188 *          | 108   | 139            |
| 6          | 129    | 38.1           | 137    | 264 *          | 132    | 26.8           | 150   | 211          | 147    | 230            | 109   | 139            |
| 7          | 120    | 40.6           | 138    | 42.4           | 40.3   | 24.7           | 124 * | 198          | 144    | 129            | 111   | 138            |
| 8          | 111    | 43.4           | 157    | 39.2           | 25.8   | 23.0           | 130   | 158          | 142    | 20.5           | 115   | 129            |
| 9          | 108    | 45.9           | 157    | 36.0           | 21.2   | 21.2           | 141   | 173          | 108    | 18.4           | 135   | 129            |
| 10         | 75.6   | 51.2           | 156    | 32.5           | 19.4   | 20.8           | 124   | 195          | 90.1   | 17.3           | 146   | 127            |
| 11         | 96.0   | 62.9           | 155    | 30.4           | 30.0   | 20.5           | 122   | 193          | 75.6   | 17.3           | 165   | 143            |
| 12         | 110    | 65.3           | 58.3   | 27.9           | 105    | 20.1           | 147   | 190          | 50.9   | 66.7           | 166   | 162            |
| 13         | * 76.3 | 66.7           | 31.1   | 25.4           | 99.2   | 20.1           | 169   | 188          | 57.9   | 121            | 159   | 161            |
| 14         | 77.3   | 92.5           | 30.0   | 23.0           | 96.4   | 19.1           | 164   | 186          | * 96.1 | 133            | 144   | 149 *          |
| 15         | 98.9   | 124            | 29.3   | 20.5           | 96.1   | 18.7           | 169   | 184          | 135    | 189            | 149   | 142            |
| 16         | 98.2   | 109            | 28.6   | 18.0           | 74.8   | * 17.7         | 193   | 205          | 138    | 192            | 158 * | 142            |
| 17         | 64.6   | 115 *          | # 96.1 | 15.5           | 62.5   | * 17.0         | 174   | 219 *        | 125    | 188            | 116   | 142            |
| 18         | 26.1   | 117            | 96.1   | 13.1           | * 75.2 | 17.7           | 171   | 181          | 117    | 156            | 121   | 143            |
| 19         | 25.8   | 118            | 96.4   | 10.9           | 92.9   | 18.4           | 185   | 172          | 99.9   | 140            | 146   | 133            |
| 20         | 25.1   | 115            | 97.8   | * 7.8          | 114    | 19.8           | 184   | 156          | 109    | 117            | 146   | 97.5           |
| 21         | 24.4   | 124            | 115    | 6.4            | 101    | 21.2           | 185 * | 155          | 135    | 145            | 156   | 124            |
| 22         | 20.8   | 136            | 115    | 7.8            | 97.1   | 22.6           | 179   | 155          | 129    | 170            | 170   | 123            |
| 23         | 5.3    | 135            | 111    | 10.9           | 93.9   | 24.0           | 168   | 157          | 131    | 151 *          | 163   | 118            |
| 24         | 4.9    | 134            | 134    | 11.7           | 89.7   | 33.5           | 186   | 155          | 141    | 149            | 155   | 83.0           |
| 25         | 28.6   | 136            | 172    | 12.0           | 85.8   | 58.3           | 192   | 166          | 152    | 148            | 155   | 75.6           |
| 26         | * 64.3 | 135            | 173    | 13.1           | 100    | 68.5           | 203   | 174          | 129    | 146            | 156   | 75.2           |
| 27         | 41.0   | 125            | 175    | 14.5           | 126    | 84.8           | 203   | 174          | 131    | 127            | 150   | 74.9           |
| 28         | 38.5   | 102            | 171    | 15.9           | 103    | 101            | 218   | 173          | 160    | 124            | 139   | 75.6           |
| 29         | 71.0   | 159            | 18.7   | 80.9           | 83.3   | 231            | 148   | 161          | 150    | 142            | 142   | 90.8           |
| 30         | 73.1   | 159            | 20.5   | 68.2           | 74.9   | 255            | 157   | 174          | 139    | 149            | 149   | 91.5           |
| 31         | 60.7   | 174            |        | 37.4           |        | 230            | 173   |              | 125    |                |       | 89.7           |
| <b>Sum</b> |        | <b>2,476.6</b> |        | <b>1,842.1</b> |        | <b>1,043.0</b> |       | <b>5,673</b> |        | <b>4,283.2</b> |       | <b>3,779.8</b> |
|            |        | 2,180.9        |        | 3,723.9        |        | 2,262.7        |       | 5,075.8      |        | 3,837.5        |       | 4,218          |

**Current Year 1981**

**Period 1968-1981**

| Month  | Average Rainfall<br>Inches*** |             | Extreme Second-Feet |                         | Average<br>Second-<br>Feet | Total<br>Acre-Feet        | Acre-Feet |         |         |
|--------|-------------------------------|-------------|---------------------|-------------------------|----------------------------|---------------------------|-----------|---------|---------|
|        |                               |             | High                | Low                     |                            |                           | Average   | Maximum | Minimum |
|        | 1939-1981                     | 1981        | Day                 | Day                     |                            |                           |           |         |         |
| Jan.   | 0.75                          | 1.62        | 6                   | 129                     | 24                         | 4.9                       | 70.3      | 4,326   | 11,576  |
| Feb.   | .86                           | .16         | 15                  | 149                     | 5                          | 35.3                      | 88.3      | 4,911   | 10,531  |
| Mar.   | .66                           | 1.00        | 31                  | 198                     | 17                         | 27.9                      | 120       | 7,387   | 16,718  |
| Apr.   | 1.86                          | 7.96        | 6                   | 266                     | 21                         | .7                        | 61.4      | 3,651   | 17,934  |
| May    | 3.11                          | 3.71        | 6                   | 219                     | 1                          | 16.2                      | 73.1      | 4,488   | 15,401  |
| June   | 2.20                          | 5.96        | 28                  | 144                     | 17                         | 16.6                      | 34.6      | 2,066   | 18,576  |
| July   | 1.48                          | .37         | 30                  | 266                     | 1                          | 76.6                      | 164       | 10,063  | 19,870  |
| Aug.   | 2.14                          | 1.05        | 17                  | 248                     | 31                         | 133                       | 183       | 11,258  | 17,485  |
| Sept.  | 2.92                          | 1.14        | 30                  | 206                     | 13                         | 47.0                      | 128       | 7,611   | 24,355  |
| Oct.   | 2.14                          | 1.58        | 6                   | 231                     | 12                         | 13.4                      | 138       | 8,499   | 11,063  |
| Nov.   | .75                           | T           | 122                 | 170                     | 8                          | 87.9                      | 141       | 8,367   | 16,504  |
| Dec.   | .63                           | .14         | 111                 | 164                     | 28                         | 71.3                      | 122       | 7,493   | 10,575  |
|        | 19.50                         | 24.69       |                     | 266                     | 0.7                        | 111                       | 80,123    | 172,315 | 213,138 |
| Yearly |                               | Millimeters |                     | Cubic Meters per Second |                            | Thousands of Cubic Meters |           |         |         |
|        |                               |             |                     |                         |                            | 98,832                    | 212,551   | 262,906 | 98,832  |

\*\* Period 1968-1981      \* Discharge measurement made on this day  
 \*\*\* On the United States side from Maverick Power Plant to Cuervo Creek      ! And other days

**RETURN FLOW TO THE RIO GRANDE  
FROM THE MAVERICK IRRIGATION DISTRICT  
ABOVE EAGLE PASS, TEXAS**

**DESCRIPTION:** Part of the water diverted from the Rio Grande into the Maverick Canal is returned to the river through various drains and spillways of the irrigation system located between Maverick Diversion Dam and Eagle Pass, Texas. These return flows are measured at gaging stations consisting of sharp-crested Cipolletti weirs or control structures equipped with continuous water-stage recorders located at Lateral 2 Spill, Canon Grande, Quemado Creek, Lateral 15 Spill, Hardt Spill, Houchin Spill, Lateral 12 Spill, Lateral 8-B Spill, Elm Creek, and Seco Creek; and a Parshall flume at the Lateral 2 Sand Trap Spill into La Moras Creek immediately below the canal siphon.

**RECORDS:** Based on the weir discharge table and a continuous record of gage heights. All storm flow occurring at these stations is deducted from the records and is not shown below. Records available: April 1959 through 1981. Records prior to 1976 were published under the title "Return Flow to the Rio Grande from Maverick Canal - Maverick Dam to Eagle Pass, Texas."

**REMARKS:** In addition to the flows listed below, water from the Maverick Canal is returned to the Rio Grande in this reach at the Maverick Power Plant (see page 51).

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second)** |      |            |                |      |  |  |                  |  |               |      |  |
|---|------|------------|----------------|------|--|--|------------------|--|---------------|------|--|
| Daily:  | Max. | 929 (26.3) | Sept. 29, 1975 |      |  |  | Min. 18.3 (0.52) |  | March 9, 1969 |      |  |
| Monthly:  | Max. | 151 (4.36) | June 1968      |      |  |  | Min. 32.8 (0.93) |  | January 1973  |      |  |
| Yearly:   | Max. | 126 (3.57) |                | 1968 |  |  | Min. 49.6 (1.40) |  |               | 1981 |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.    | March   | April   | May     | June    | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|---------|---------|---------|---------|---------|---------|------|------|-------|------|------|------|
| 1          | 50.3    | 27.7    | 52.1    | 48.8    | 54.8    | 47.2    | 45.2 | 51.0 | 48.0  | 53.7 | 36.1 | 62.0 |
| 2          | 47.1    | 22.1    | 43.2    | 68.2    | 56.0    | 52.7    | 55.6 | 53.1 | 43.2  | 57.8 | 43.3 | 68.3 |
| 3          | 47.2    | 22.1    | 49.6    | 60.7    | 65.1    | 56.9    | 48.1 | 47.4 | 30.2  | 55.7 | 55.5 | 68.1 |
| 4          | 52.3    | 25.3    | 55.3    | 49.6    | 59.4    | 61.1    | 51.8 | 49.9 | 25.0  | 48.9 | 58.8 | 60.4 |
| 5          | 49.9    | 26.6    | 58.9    | 34.1    | 55.0    | 52.3    | 48.1 | 66.9 | 32.5  | 54.2 | 74.9 | 58.6 |
| 6          | 57.9    | 26.8    | 71.0    | 37.3    | 53.5    | 51.3    | 45.9 | 62.9 | 43.5  | 46.9 | 68.3 | 38.8 |
| 7          | 58.3    | 26.2    | 51.8    | 43.6    | 51.9    | 47.8    | 42.6 | 60.8 | 45.7  | 41.0 | 69.8 | 55.6 |
| 8          | 46.3    | 26.7    | 45.8    | 45.7    | 50.1    | 48.0    | 44.2 | 66.7 | 67.3  | 41.1 | 60.4 | 61.8 |
| 9          | 41.6    | 27.3    | 42.3    | 49.7    | 47.0    | 46.1    | 41.4 | 51.1 | 57.0  | 37.5 | 58.2 | 67.9 |
| 10         | 45.8    | 25.7    | 38.6    | 56.4    | 40.4    | 47.7    | 48.6 | 70.6 | 46.0  | 43.0 | 56.8 | 61.4 |
| 11         | 32.9    | 25.3    | 42.6    | 43.4    | 43.0    | 53.2    | 55.0 | 66.1 | 42.3  | 41.8 | 56.0 | 53.9 |
| 12         | 39.0    | 26.5    | 40.7    | 38.1    | 41.9    | 47.1    | 46.7 | 71.8 | 45.3  | 44.0 | 58.7 | 59.3 |
| 13         | 37.8    | 26.5    | 42.3    | 33.9    | 47.0    | 46.9    | 41.9 | 68.0 | 41.0  | 50.7 | 54.8 | 57.8 |
| 14         | 37.5    | 25.1    | 34.6    | 33.3    | 44.0    | 42.7    | 44.7 | 60.9 | 45.3  | 53.3 | 50.7 | 53.0 |
| 15         | 36.1    | 24.8    | 28.7    | 30.9    | 55.2    | 42.1    | 46.5 | 57.5 | 48.3  | 63.6 | 44.3 | 54.8 |
| 16         | 39.5    | 28.5    | 37.4    | 49.7    | 65.7    | 51.8    | 44.2 | 51.1 | 48.8  | 58.7 | 38.9 | 57.4 |
| 17         | 51.5    | 32.0    | 28.5    | 64.0    | 45.1    | 60.8    | 47.5 | 44.1 | 55.0  | 43.5 | 53.8 | 53.8 |
| 18         | 31.2    | 38.2    | 26.5    | 62.8    | 47.4    | 74.1    | 48.2 | 46.6 | 42.0  | 51.8 | 54.8 | 55.0 |
| 19         | 33.2    | 38.4    | 30.9    | 63.2    | 40.9    | 65.7    | 46.0 | 54.7 | 46.4  | 44.6 | 54.1 | 38.9 |
| 20         | 38.3    | 31.3    | 40.7    | 56.5    | 37.4    | 64.3    | 60.2 | 71.4 | 36.6  | 46.1 | 63.7 | 37.4 |
| 21         | 36.2    | 32.6    | 45.4    | 56.4    | 53.2    | 62.1    | 59.5 | 63.8 | 40.9  | 48.7 | 65.3 | 49.2 |
| 22         | 27.8    | 29.0    | 43.3    | 56.2    | 52.9    | 58.4    | 60.2 | 59.5 | 43.2  | 69.4 | 53.6 | 53.8 |
| 23         | 26.3    | 34.4    | 38.8    | 65.2    | 48.5    | 54.1    | 60.1 | 63.0 | 43.2  | 41.8 | 75.2 | 64.4 |
| 24         | 23.1    | 47.8    | 40.2    | 69.6    | 41.9    | 56.7    | 60.4 | 51.3 | 48.4  | 38.5 | 69.9 | 61.3 |
| 25         | 26.8    | 54.7    | 45.6    | 76.1    | 45.5    | 66.5    | 59.8 | 41.2 | 59.0  | 40.7 | 57.7 | 48.1 |
| 26         | 29.6    | 49.6    | 51.1    | 76.9    | 45.0    | 78.4    | 57.9 | 43.4 | 73.8  | 42.2 | 65.5 | 47.9 |
| 27         | 24.4    | 58.9    | 55.2    | 73.4    | 46.7    | 58.5    | 63.3 | 54.8 | 54.2  | 52.6 | 59.1 | 53.1 |
| 28         | 26.0    | 60.4    | 54.0    | 69.9    | 56.0    | 52.2    | 59.9 | 61.5 | 51.5  | 49.0 | 62.6 | 54.9 |
| 29         | 25.4    |         | 51.2    | 72.0    | 56.8    | 49.4    | 51.9 | 77.2 | 62.5  | 44.6 | 53.4 | 52.8 |
| 30         | 23.6    |         | 46.8    | 59.5    | 62.6    | 47.5    | 57.2 | 54.4 | 64.5  | 36.4 | 59.0 | 66.2 |
| 31         | 23.6    |         | 44.3    |         | 59.1    |         | 47.4 | 48.0 |       | 51.2 |      | 68.5 |
| <b>Sum</b> | 920.5   | 1,645.1 | 1,643.6 | 1,790.3 | 1,504.5 | 1,744.4 |      |      |       |      |      |      |
|            | 1,166.5 | 1,377.4 | 1,569.0 | 1,590.0 | 1,419.7 | 1,722.9 |      |      |       |      |      |      |

**Current Year 1981**

| Month  | Extreme Gage Feet   |     |           | Average Second-Feet     | Total Acre-Feet | Acre-Feet |                           |         |  |
|--------|---------------------|-----|-----------|-------------------------|-----------------|-----------|---------------------------|---------|--|
|        | Extreme Second-Feet |     | Acre-Feet |                         |                 | Average   | Maximum                   | Minimum |  |
|        | High                | Low | Day       | Day                     |                 |           |                           |         |  |
| Jan.   |                     |     | 7         | 58.3                    | 24              | 23.1      | 37.6                      | 2,314   |  |
| Feb.   |                     |     | 28        | 60.4                    | 12              | 22.1      | 32.9                      | 1,826   |  |
| Mar.   |                     |     | 6         | 71.0                    | 18              | 26.5      | 44.4                      | 2,732   |  |
| Apr.   |                     |     | 26        | 76.9                    | 15              | 30.9      | 54.8                      | 3,263   |  |
| May    |                     |     | 16        | 65.7                    | 20              | 37.4      | 50.6                      | 3,112   |  |
| June   |                     |     | 26        | 78.4                    | 15              | 42.1      | 54.8                      | 3,260   |  |
| July   |                     |     | 27        | 63.3                    | 9               | 41.4      | 51.3                      | 3,154   |  |
| Aug.   |                     |     | 29        | 77.2                    | 25              | 41.2      | 57.8                      | 3,551   |  |
| Sept.  |                     |     | 26        | 73.8                    | 4               | 25.0      | 47.3                      | 2,816   |  |
| Oct.   |                     |     | 22        | 69.4                    | 30              | 36.4      | 48.5                      | 2,984   |  |
| Nov.   |                     |     | 23        | 75.2                    | 1               | 36.1      | 57.4                      | 3,417   |  |
| Dec.   |                     |     | 31        | 68.5                    | 20              | 37.4      | 56.3                      | 3,460   |  |
|        |                     |     |           | 78.4                    | 22.1            | 49.6      | 35,889                    | 49,957  |  |
| Yearly | Meters              |     |           | Cubic Meters per Second |                 |           | Thousands of Cubic Meters |         |  |
|        |                     |     |           |                         | 2.22            | 0.63      | 1.40                      | 44,269  |  |
|        |                     |     |           |                         |                 |           |                           | 61,620  |  |
|        |                     |     |           |                         |                 |           |                           | 112,863 |  |
|        |                     |     |           |                         |                 |           |                           | 44,269  |  |

\*\* Period 1968-1981

Ø Mean daily

! And other days

## RIO GRANDE AT PIEDRAS NEGRAS, COAHUILA AND EAGLE PASS, TEXAS

**DESCRIPTION:** Cableway, gravity well, water-stage recorder, and resistance-type transmitter located on the left bank at latitude 28° 42' 50", longitude 100° 30' 25", and river mile 497.0 (799.8 km), 0.6 river mile (1.0 km) upstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila and 77.0 river miles (123.8 km) downstream from Amistad Dam. The zero of the gage is 682.91 feet (208.15 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 36 discharge measurements during the year, 24 by the Mexican Section and 12 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: May 1900 through March 1914; August 1914 through April 1916; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June 1922; September, November, and December 1923; and 1924 through 1981. Records prior to 1976 were published under the title "Rio Grande at Eagle Pass, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The transmitter is coupled, via leased telephone circuits, to a receiver located in the office of the Eagle Pass and Piedras Negras Bridge Company from where the Wheatstone bridge circuit can be balanced to indicate the existing gage height. This system is operated in cooperation with the National Weather Service.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 964,100 second-feet (27,300 m<sup>3</sup>/sec), determined by slope-area calculations, on June 29, 1954 with a gage height of 53.51 feet (16.31 m). Well-authenticated information indicates the occurrence of a flood in June 1865 with an estimated discharge of 1,236,000 second-feet (35,000 m<sup>3</sup>/sec) and a gage height of 56.00 feet (17.07 m) on the present gage, and also that these were the only floods since 1745 with flows greater than 825,000 second-feet (23,400 m<sup>3</sup>/sec). Min. 24.4 second-feet (0.69 m<sup>3</sup>/sec) on June 22, 1953 with a gage height of 0.07 foot (0.02 m).

Average Flow in Second-Feet (Cubic Meters per Second)\*

|          |                      |               |                 |                      |
|----------|----------------------|---------------|-----------------|----------------------|
| Daily:   | Max. 101,400 (2,870) | July 19, 1975 | Min. 187 (5.30) | June 6, 7, & 8, 1972 |
| Monthly: | Max. 22,000 (622)    | Sept. 1974    | Min. 323 (9.16) | June 1969            |
| Yearly:  | Max. 5,190 (147)     | 1974          | Min. 971 (27.5) | 1972                 |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.    | Feb.    | March   | April    | May     | June    | July    | Aug.    | Sept.   | Oct.     | Nov.    | Dec.    |
|------------|---------|---------|---------|----------|---------|---------|---------|---------|---------|----------|---------|---------|
| 1          | 2,450   | 2,200   | 1,820   | 1,610    | 2,970   | 1,880   | 3,710   | 1,070   | 2,390   | 4,730    | 2,450   | 2,730 * |
| 2          | 2,430   | 2,200   | 1,800   | 1,700    | 3,530   | 1,780   | 3,670 * | 1,010   | 2,190   | 1,910    | 2,430   | 2,710   |
| 3          | 2,390   | 2,180   | 1,780 * | 2,200    | 4,030   | 1,660   | 3,670   | 1,010   | 2,300   | 1,620    | 2,360   | 2,450 * |
| 4          | 2,420   | 2,180   | 1,860   | 2,230    | 4,030   | 1,670   | 3,600   | 982 *   | 4,240   | 1,580    | 2,320 * | 2,410   |
| 5          | 2,420   | 2,230   | 1,790   | 2,200    | 3,530   | 2,480   | 3,460   | 961     | 4,310   | 1,470    | 2,310   | 2,380   |
| 6          | 2,420 * | 2,230   | 1,750   | 2,230    | 2,980   | 3,340   | 3,520   | 876     | 3,710   | 1,470    | 2,320   | 2,350   |
| 7          | 2,420   | 2,230   | 1,800   | 2,220    | 3,070   | 2,850   | 3,530   | 961     | 5,050   | 4,980    | 2,270   | 2,300   |
| 8          | 2,420   | 2,200   | 1,820   | 2,170 *  | 2,960   | 2,770   | 3,530   | 1,400   | 5,230   | 2,290    | 2,330   | 2,260   |
| 9          | 2,390   | 2,180   | 1,800   | 2,100    | 2,750   | 2,700 * | 3,530   | 1,950   | 3,920   | 2,170    | 2,290   | 2,190   |
| 10         | 2,420   | 2,150 * | 1,780   | 2,200    | 2,530   | 2,630   | 3,370   | 1,790   | 3,500   | 2,160    | 2,220   | 2,190   |
| 11         | 2,360   | 2,140   | 1,850   | 2,210    | 2,470   | 2,600   | 2,820   | 1,770   | 4,310   | 2,150    | 2,200   | 2,160   |
| 12         | 2,310   | 2,070   | 2,000   | 2,200    | 2,280   | 2,880   | 2,820   | 1,770   | 4,340   | 7,200    | 2,250   | 2,110   |
| 13         | 2,330   | 2,070   | 2,100   | 2,200    | 2,290   | 3,160   | 2,790   | 1,730   | 4,380   | 13,700 * | 2,320   | 2,110   |
| 14         | 2,330   | 2,070   | 2,070   | 2,280 *  | 2,210   | 3,100   | 2,780 * | 1,770   | 4,310   | 13,800   | 2,390   | 2,110   |
| 15         | 2,270   | 1,900   | 2,050   | 3,530    | 2,150   | 3,040   | 2,810   | 1,880   | 7,130   | 13,800   | 2,490   | 2,080   |
| 16         | 2,230   | 1,900   | 2,020   | 3,810    | 2,180   | 8,550 * | 2,310   | 2,300   | 8,050   | 13,800   | 2,520   | 2,080   |
| 17         | 2,190   | 1,900   | 1,920 * | 4,380    | 2,610   | 7,060   | 2,410   | 2,220   | 8,190   | 9,460    | 2,570 * | 2,060   |
| 18         | 1,940   | 1,840   | 1,900   | 6,850    | 2,610   | 5,330   | 2,730   | 2,930   | 8,160   | 7,350    | 2,620   | 2,060   |
| 19         | 1,980   | 1,840 * | 1,870   | 7,100    | 2,460   | 4,730 * | 2,720   | 5,260   | 8,190   | 7,240    | 2,730   | 2,060   |
| 20         | 2,390 * | 1,870   | 1,840   | 6,070 *  | 2,030   | 4,480   | 2,660   | 6,430   | 8,190   | 7,770    | 2,770   | 2,130   |
| 21         | 2,390   | 1,830   | 1,900   | 5,720    | 1,850 * | 4,310   | 2,590 * | 6,530   | 8,330   | 7,910    | 2,830   | 2,110   |
| 22         | 2,390 * | 1,770   | 1,900   | 6,360    | 2,040   | 4,100   | 2,460   | 7,420   | 8,400   | 8,090    | 2,860   | 2,110   |
| 23         | 2,420   | 1,800   | 1,870   | 12,200 * | 2,130   | 3,960   | 2,060   | 8,120   | 8,400   | 8,160    | 2,860   | 1,960   |
| 24         | 2,420   | 1,770 * | 1,820   | 14,000   | 2,150   | 3,960   | 1,890   | 8,190   | 6,670 * | 8,120    | 2,850 * | 1,690   |
| 25         | 2,390   | 1,730   | 1,700   | 8,330    | 2,210   | 3,850   | 1,650   | 5,760   | 6,250   | 8,090    | 2,860   | 1,650   |
| 26         | 2,310   | 1,700   | 1,670 * | 6,640    | 2,150 * | 3,880   | 1,690   | 2,450   | 6,250   | 8,050    | 2,940   | 1,650   |
| 27         | 2,280   | 1,670   | 1,710   | 6,140    | 1,820   | 3,850   | 1,760   | 1,560 * | 6,290   | 6,070    | 2,920   | 1,650   |
| 28         | 2,310   | 1,710   | 1,730   | 5,860 *  | 1,650   | 3,710   | 1,830 * | 1,740   | 6,290   | 3,500    | 2,950   | 1,650   |
| 29         | 2,270   | 1,800   | 1,800   | 4,630    | 1,700   | 3,740   | 1,730   | 1,970   | 5,470   | 2,530    | 2,960   | 1,620 * |
| 30         | 2,200   | 1,780   | 1,780   | 3,010    | 1,780   | 3,780   | 1,640   | 2,140   | 6,640   | 2,460    | 2,980   | 1,590   |
| 31         | 2,200   | 1,660 * | 1,660 * | 1,840    | 1,840   | 1,210   | 2,500   | 2,430   | 1,210   | 2,430    | 1,620   |         |
| <b>Sum</b> | 55,560  | 134,380 | 107,830 |          |         | 88,450  | 186,020 |         |         | 77,170   | 64,230  |         |
|            | 72,090  | 57,160  | 76,990  |          | 82,950  | 171,080 |         |         |         |          |         |         |

### Current Year 1981

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet                  | Period 1968-1981 |           |           |         |  |  |
|---------------|-------------------|------|-----|--------------------------------|------|---------------------|----------------------------------|------------------|-----------|-----------|---------|--|--|
|               | High              |      | Low | Day                            |      |                     |                                  | Acre-Feet        |           |           |         |  |  |
|               | High              | Low  | Day | Day                            | Day  |                     |                                  | Average          | Maximum   | Minimum   |         |  |  |
| Jan.          | 3.54              | 3.18 | 1   | 2,470                          | 117  | 1,900               | 2,320                            | 142,900          | 98,426    | 173,614   | 26,191  |  |  |
| Feb.          | 3.41              | 3.05 | 5   | 2,450                          | 126  | 1,670               | 1,980                            | 110,195          | 127,477   | 448,150   | 35,604  |  |  |
| Mar.          | 3.31              | 2.99 | 113 | 2,100                          | 31   | 1,590               | 1,840                            | 113,327          | 129,637   | 397,213   | 20,899  |  |  |
| Apr.          | 10.01             | 2.95 | 24  | 17,600                         | 1    | 1,550               | 4,180                            | 266,523          | 116,628   | 351,859   | 24,030  |  |  |
| May           | 4.53              | 2.95 | 3   | 4,200                          | 28   | 1,510               | 2,480                            | 152,713          | 204,245   | 588,871   | 36,193  |  |  |
| June          | 8.56              | 2.99 | 16  | 14,000                         | 3    | 1,560               | 3,600                            | 213,856          | 161,549   | 415,943   | 19,254  |  |  |
| July          | 4.27              | 2.69 | 1   | 3,740                          | 31   | 1,090               | 2,680                            | 164,495          | 211,999   | 779,878   | 26,100  |  |  |
| Aug.          | 6.40              | 2.36 | 24  | 8,190                          | 7    | 703                 | 2,850                            | 175,450          | 196,821   | 743,286   | 56,856  |  |  |
| Sept.         | 6.56              | 2.92 | 23  | 8,550                          | 3    | 1,450               | 5,720                            | 339,370          | 268,881   | 1,306,836 | 80,699  |  |  |
| Oct.          | 8.73              | 2.89 | 13  | 14,500                         | 5    | 1,410               | 6,000                            | 369,027          | 236,651   | 891,747   | 58,642  |  |  |
| Nov.          | 4.00              | 3.31 | 30  | 3,270                          | 10   | 2,140               | 2,570                            | 153,035          | 144,833   | 570,870   | 46,790  |  |  |
| Dec.          | 4.00              | 2.99 | 1   | 3,300                          | 30   | 1,560               | 2,070                            | 127,328          | 102,822   | 268,589   | 26,197  |  |  |
|               | 10.01             | 2.36 |     | 17,600                         |      | 703                 | 3,220                            | 2,328,219        | 1,999,969 | 3,753,089 | 705,670 |  |  |
| <b>Yearly</b> | <b>Meters</b>     |      |     | <b>Cubic Meters per Second</b> |      |                     | <b>Thousands of Cubic Meters</b> |                  |           |           |         |  |  |
|               | 3.05              | 0.72 |     | 498                            | 19.9 | 91.1                | 2,871,825                        | 2,466,936        | 4,629,385 |           | 870,435 |  |  |

\*\* Period 1968-1981      \* Discharge measurement made on this day      ! And other days

## RIO ESCONDIDO AT VILLA DE FUENTE, COAHUILA

**DESCRIPTION:** Cableway, gravity well, concrete control weir of 1,750 second-foot (50 m<sup>3</sup>/sec) capacity, and water-stage recorder located on the downstream side of the left abutment of the highway bridge over Rio Escondido on the outskirts of Villa de Fuente, Coahuila, 1.2 river miles (1.9 km) downstream from the cableway at latitude 28°40'05", longitude 100°31'00", about 3 miles (5 km) southwest of Piedras Negras, Coahuila, 3.7 river miles (6.0 km) from the confluence with the Rio Grande, and 6.8 river miles (10.9 km) downstream from the confluence of Rio San Antonio with Rio Escondido. Rio Escondido enters the Rio Grande at river mile 493.2 (793.8 km), 3.1 river miles (5.0 km) downstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. The zero of the gage is 718.37 feet (218.96 m) above mean sea level, U. S. C. G. S. datum.

**RECORDS:** Based on 13 discharge measurements during the year and a continuous record of gage heights. Records available: 1922 through 1981. Records from 1922 through September 1932 are considered doubtful.

**REMARKS:** Diversions and drainage returns modify the flow of this spring-fed stream at this station. Backwater from the Rio Grande reached an elevation of 729.92 feet (222.48 m) during the flood of June 1954. Prior to November 1954, the gage well was located at the present cableway site. The weir was destroyed by a flood on September 24, 1964. On November 25, 1969, the concrete control weir was finished and placed in operation.

**EXTREME FLOWS FROM RECORDS\*\*:** Momentary: Max. 24,000 second-feet (680 m<sup>3</sup>/sec) on June 29, 1936 with a gage height of 19.13 feet (5.83 m). Min. frequently no flow.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                   |                |                 |                               |
|----------|-------------------|----------------|-----------------|-------------------------------|
| Daily:   | Max. 13,100 (371) | Sept. 24, 1964 | Min. 0          | Several days 1956-1958 & 1965 |
| Monthly: | Max. 827 (23.4)   | Sept. 1964     | Min. 0.3 (0.01) | September 1965                |
| Yearly:  | Max. 219 (6.21)   | 1976           | Min. 2.4 (0.07) | 1956                          |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.  | Feb.    | March   | April  | May   | June  | July  | Aug.    | Sept. | Oct.    | Nov.  | Dec.   |
|------------|-------|---------|---------|--------|-------|-------|-------|---------|-------|---------|-------|--------|
| 1          | 155   | 151     | 91.8    | 51.9   | 427   | 308   | 237   | 144     | 109   | 129     | 107   | 97.5   |
| 2          | 155   | 147     | 86.2    | 51.9   | 445   | 286 * | 237   | 144     | 175   | 129     | 107   | 97.5   |
| 3          | 151   | 147 *   | 89.0    | 51.9   | 523   | 299   | 237   | 139     | 236   | 129     | 107   | 97.5   |
| 4          | 144   | 151     | 89.0    | 50.1   | 410   | 287   | 222   | 133     | 156   | 129     | 107   | 97.5   |
| 5          | 129   | 151     | 86.2    | 48.0   | 388   | 275   | 217   | 129     | 150   | 123     | 107   | 97.5   |
| 6          | 129 * | 151     | 86.2    | 49.4   | 374   | 270   | 222   | 129     | 143   | 137     | 108   | 97.5   |
| 7          | 129   | 151     | 86.2    | * 50.1 | 367   | 268   | 237 * | 124     | 136   | 147     | 111   | 97.5   |
| 8          | 129   | 151     | 86.2    | 50.1   | 360   | 257   | 232   | 132     | 136 * | 136     | 103   | 100    |
| 9          | 133   | 151     | * 81.2  | 58.6   | 360   | 257   | 227   | 129     | 136   | 129 *   | 103   | 103    |
| 10         | 140   | 151     | 81.2    | 76.3   | 350   | 247   | 227   | 129     | 144   | 129     | 103   | 103    |
| 11         | 144   | 151     | 86.2    | 71.3   | 344 * | 247   | 217   | 126     | 148   | 129     | 103   | 100    |
| 12         | 144   | 147     | 91.8    | 71.0   | 344   | 247   | 213   | 123     | 148   | 126     | 103   | 97.5   |
| 13         | 144   | 144     | 89.0    | 69.2   | 337   | 242   | 208   | 119     | 148   | 126     | 103   | 94.6   |
| 14         | 144   | 144     | 86.2    | 205    | 337   | 237   | 208   | 116     | 151   | 126     | 103   | 89.3   |
| 15         | 144   | 144     | 83.7    | 650 *  | 337   | 232   | 208   | 116     | 151   | 126     | 103   | 83.7   |
| 16         | 140   | 140     | 89.0    | 189    | 337   | 727   | 204   | 116     | 151   | 123     | 101   | 81.2   |
| 17         | 140   | 136     | 91.8    | 191    | 332   | 381   | 195   | 113 *   | 151   | 123     | 97.5  | 81.2   |
| 18         | 144   | 127     | 89.0    | 210    | 325   | 298   | 191   | 131     | 151   | 119     | 97.5  | 81.2   |
| 19         | 156   | 116     | 86.2    | 176    | 313   | 273   | 186   | 153     | 148   | 116     | 94.6  | 81.2   |
| 20         | 162   | 116     | 83.7    | 178    | 307   | 268   | 182   | 136     | 144   | 123     | 91.8  | 81.2   |
| 21         | 159   | 113     | 81.2    | 198    | 307   | 257   | 174   | 136     | 148   | 123     | 97.5  | 81.2   |
| 22         | 155   | 109     | 78.4    | 204    | 301   | 252   | 174   | 136     | 148   | 119     | 100   | * 81.2 |
| 23         | 151   | 109     | 78.4    | 611    | 295   | 247   | 174   | 133     | 141   | 123     | 101   | 81.2   |
| 24         | 151   | 109     | 75.9    | 710    | 327   | 247   | 174   | 129     | 136   | 126     | 106 * | 81.2   |
| 25         | 151   | 113     | 73.5    | 316    | 332   | 242   | 160   | 126     | 135   | 126     | 100   | 81.2   |
| 26         | 159   | 113     | 71.3    | 267    | 276   | 250   | 155   | 116     | 131   | 116     | 100   | 81.2   |
| 27         | 159   | 113     | 71.3    | 252    | 268   | 252   | 155   | 109     | 129   | 116     | 100   | 81.2   |
| 28         | 159   | 84.8    | 73.5    | 259    | 263   | 242   | 155   | 109     | 129   | 116     | 100   | 83.0   |
| 29         | 159   |         | 73.5    | 273    | 466   | 242   | 155   | 109     | 129   | 116     | 103   | 89.7   |
| 30         | 159   |         | 68.9    | 350    | 308   | 242   | 151   | 109     | 129   | 113     | 97.5  | 96.1   |
| 31         | 155   |         | 60.0    |        | 301   |       | 149   | 109     |       | 109     |       | 97.5   |
| <b>Sum</b> |       | 3,730.8 | 5,988.8 | 8,379  |       | 3,902 |       | 3,857   |       | 2,794.3 |       |        |
| 4,573      |       | 2,545.7 | 10,761  | 6,083  |       | 4,367 |       | 3,065.4 |       |         |       |        |

| Current Year 1981   |                   |      |                     |                         |  |                 | Period 1933-1981          |         |         |
|---------------------|-------------------|------|---------------------|-------------------------|--|-----------------|---------------------------|---------|---------|
| Month               | Extreme Gage Feet |      | Extreme Second-Feet |                         | Average Second-Feet                      | Total Acre-Feet | Acre-Feet                 |         |         |
|                     | High              | Low  | Day                 | High                    | Low                                      |                 | Average                   | Maximum | Minimum |
| Jan.                | 1.80              | 1.64 | 12                  | 166                     | 1 5                                      | 129             | 147                       | 9,061   | 3,014   |
| Feb.                | 1.74              | 1.02 | ! 1                 | 151                     | 28                                       | 36.4            | 133                       | 7,402   | 2,253   |
| Mar.                | 1.44              | 1.18 | ! 1                 | 91.8                    | 31                                       | 54.0            | 82.3                      | 5,049   | 1,839   |
| Apr.                | 6.20              | 1.15 | 23                  | 4,700                   | 5  | 48.0            | 200                       | 11,881  | 2,275   |
| May                 | 3.38              | 2.17 | 3                   | 540                     | 127                                      | 263             | 347                       | 21,336  | 3,977   |
| June                | 3.87              | 2.03 | 16                  | 1,300                   | 15                                       | 227             | 279                       | 16,624  | 2,705   |
| July                | 2.07              | 1.71 | ! 1                 | 237                     | 17                                       | 144             | 196                       | 12,059  | 2,118   |
| Aug.                | 1.94              | 1.51 | 18                  | 200                     | 28                                       | 103             | 126                       | 7,744   | 3,614   |
| Sept.               | 2.43              | 1.51 | 3                   | 360                     | ! 1                                      | 107             | 145                       | 8,664   | 4,779   |
| Oct.                | 1.87              | 1.54 | 6                   | 182                     | 31                                       | 99.8            | 124                       | 7,646   | 4,128   |
| Nov.                | 1.57              | 1.44 | 7                   | 116                     | 20                                       | 91.8            | 102                       | 6,088   | 3,360   |
| Dec.                | 1.51              | 1.38 | ! 9                 | 103                     | 116                                      | 81.2            | 90.1                      | 5,545   | 2,959   |
|                     | 6.20              | 1.02 |                     | 4,700                   |  | 36.4            | 165                       | 119,099 | 37,021  |
| Yearly              | Meters            |      |                     | Cubic Meters per Second |  |                 | Thousands of Cubic Meters |         |         |
|                     | 1.89              | 0.31 |                     | 133                     |  | 1.03            | 4.66                      | 146,908 | 45,665  |
| ** Period 1932-1981 |                   |      |                     |                         | * Discharge measurement made on this day |                 |                           |         |         |
|                     |                   |      |                     |                         | ! And other days                         |                 |                           |         |         |

**RETURN FLOW TO THE RIO GRANDE  
FROM THE MAVERICK IRRIGATION DISTRICT  
BELOW EAGLE PASS, TEXAS**

**DESCRIPTION:** Part of the water diverted from the Rio Grande into the Maverick Canal is returned to the river through various drains and spillways of the irrigation system located between Eagle Pass, Texas and the El Indio Gaging Station. These return flows are measured at gaging stations consisting of sharp-created Cipolletti weirs or control structures equipped with continuous water-stage recorders located at Lateral 40 Spill, Lateral 40-D Spill, Canon Diablo, Lateral 50 Lowline No. 1, Lateral 50 Spill, Lateral 50 Lowline No. 2, Rosita Creek, Lateral 60-K Spill, Sauz Creek, Lateral 70 Spill No. 1, Lateral 70 Spill No. 2, Indio Creek, Gravel Spill, and Cuervo Creek.

**RECORDS:** Based on the weir discharge table, stable station control rating tables, and a continuous record of gage heights. All storm flow occurring at these stations is deducted from the records and is not shown below. Records available: April 1959 through 1981. Records prior to 1976 were published under the title "Return Flow to the Rio Grande from Maverick Canal, Eagle Pass to San Antonio Crossing."

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second)** |      |            |              |      |             |          |          |  |  |  |  |
|---|------|------------|--------------|------|-------------|----------|----------|--|--|--|--|
| Daily   | Max. | 350 (9.91) | July 5, 1968 | Min. | 9.7 (0.27)  | Dec.     | 10, 1980 |  |  |  |  |
| Monthly   | Max. | 247 (7.00) | July 1968    | Min. | 22.3 (0.63) | December | 1980     |  |  |  |  |
| Yearly  | Max. | 180 (5.10) | 1971         | Min. | 44.8 (1.27) |          | 1981     |  |  |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb. | March   | April | May     | June | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.    |
|------------|---------|------|---------|-------|---------|------|---------|---------|---------|---------|---------|---------|
| 1          | 45.9    | 20.9 | 41.1    | 51.5  | 52.3    | 33.8 | 41.4    | 57.4    | 29.3    | 31.7    | 77.3    | 35.1    |
| 2          | 39.7    | 26.0 | 45.1    | 42.0  | 58.0    | 39.5 | 38.3    | 68.7    | 31.1    | 31.4    | 49.0    | 34.2    |
| 3          | 38.8    | 28.4 | 47.0    | 43.0  | 63.0    | 43.6 | 39.7    | 59.4    | 47.3    | 34.6    | 26.3    | 41.9    |
| 4          | 31.8    | 29.0 | 52.6    | 43.0  | 76.6    | 47.9 | 40.5    | 55.3    | 52.6    | 53.2    | 51.3    | 38.9    |
| 5          | 25.4    | 24.3 | 36.6    | 35.5  | 94.6    | 53.2 | 43.6    | 57.7    | 40.1    | 59.2    | 55.4    | 39.6    |
| 6          | 30.0    | 24.5 | 42.1    | 41.7  | 96.7    | 48.4 | 49.3    | 48.2    | 36.7    | 68.3    | 32.1    | 41.6    |
| 7          | 52.7    | 26.5 | 52.2    | 85.3  | 103     | 42.3 | 67.0    | 48.3    | 32.8    | 89.1    | 34.1    | 42.7    |
| 8          | 64.5    | 24.2 | 56.8    | 86.4  | 72.7    | 36.5 | 83.1    | 46.2    | 33.1    | 77.5    | 39.2    | 41.7    |
| 9          | 52.6    | 27.5 | 50.3    | 76.6  | 48.5    | 31.3 | 54.2    | 42.3    | 36.1    | 91.1    | 36.6    | 47.8    |
| 10         | 60.8    | 22.6 | 48.4    | 84.0  | 31.6    | 31.7 | 35.7    | 44.6    | 36.5    | 91.6    | 34.9    | 51.6    |
| 11         | 54.2    | 12.4 | 76.7    | 64.8  | 27.1    | 30.5 | 36.5    | 54.9    | 41.9    | 74.3    | 39.2    | 51.5    |
| 12         | 51.3    | 13.3 | 112     | 50.7  | 27.3    | 30.2 | 37.0    | 54.7    | 38.6    | 42.8    | 47.2    | 42.1    |
| 13         | 48.0    | 17.4 | 92.7    | 53.0  | 24.3    | 25.6 | 32.4    | 55.6    | 33.4    | 24.2    | 67.1    | 40.6    |
| 14         | 46.1    | 25.4 | 74.8    | 58.7  | 43.4    | 27.6 | 27.0    | 54.9    | 29.3    | 21.6    | 65.4    | 56.6    |
| 15         | 45.4    | 21.1 | 62.7    | 64.2  | 64.8    | 26.9 | 36.0    | 48.4    | 28.6    | 21.3    | 65.4    | 86.1    |
| 16         | 52.2    | 36.9 | 52.2    | 66.9  | 81.8    | 28.0 | 41.2    | 44.4    | 33.0    | 21.7    | 54.0    | 63.9    |
| 17         | 53.5    | 80.9 | 31.7    | 58.6  | 92.9    | 33.0 | 43.6    | 37.3    | 37.1    | 23.5    | 46.5    | 46.1    |
| 18         | 45.1    | 90.9 | 22.4    | 62.7  | 59.6    | 45.7 | 47.3    | 42.1    | 34.8    | 26.6    | 41.4    | 51.8    |
| 19         | 89.5    | 78.3 | 17.5    | 55.4  | 33.0    | 56.3 | 43.4    | 42.3    | 34.1    | 38.9    | 34.4    | 67.0    |
| 20         | 70.5    | 64.2 | 30.3    | 53.0  | 31.8    | 52.5 | 52.0    | 36.4    | 32.2    | 47.5    | 31.2    | 55.9    |
| 21         | 47.3    | 63.0 | 56.9    | 52.2  | 33.5    | 37.6 | 52.2    | 30.1    | 30.7    | 38.3    | 29.3    | 49.1    |
| 22         | 30.3    | 52.6 | 50.9    | 49.6  | 30.5    | 31.9 | 43.8    | 31.0    | 29.9    | 36.8    | 34.8    | 39.7    |
| 23         | 15.3    | 44.3 | 34.0    | 50.5  | 29.5    | 27.3 | 39.5    | 29.8    | 42.9    | 39.0    | 34.6    | 26.9    |
| 24         | 13.5    | 56.5 | 32.2    | 52.1  | 31.1    | 23.8 | 42.8    | 36.4    | 45.9    | 36.9    | 36.7    | 34.7    |
| 25         | 13.1    | 51.8 | 40.0    | 52.2  | 37.0    | 28.5 | 39.0    | 30.1    | 45.6    | 41.2    | 50.8    | 57.2    |
| 26         | 19.9    | 53.7 | 39.1    | 47.4  | 34.1    | 30.6 | 42.1    | 32.0    | 42.9    | 55.5    | 59.0    | 54.0    |
| 27         | 25.7    | 57.1 | 44.9    | 36.8  | 28.6    | 27.3 | 43.2    | 27.2    | 42.2    | 63.4    | 44.1    | 51.0    |
| 28         | 21.1    | 51.4 | 61.5    | 35.0  | 27.9    | 28.8 | 43.5    | 24.0    | 37.3    | 62.6    | 40.1    | 41.8    |
| 29         | 15.8    | 73.6 | 43.5    | 31.0  | 62.9    | 49.3 | 27.6    | 36.8    | 63.5    | 45.8    | 30.3    |         |
| 30         | 23.1    | 49.4 | 44.2    | 35.2  | 58.3    | 43.3 | 28.4    | 36.5    | 39.9    | 47.1    | 34.2    |         |
| 31         | 30.6    | 47.5 |         | 33.6  |         | 47.5 | 27.7    |         | 48.4    |         |         | 45.4    |
| <b>Sum</b> | 1,125.1 |      | 1,640.5 |       | 1,121.5 |      |         | 1,320.4 |         | 1,495.6 |         | 1,441.0 |
|            | 1,253.7 |      | 1,575.2 |       | 1,535.0 |      | 1,375.4 |         | 1,109.3 |         | 1,350.3 |         |

**Current Year 1981****Period 1968-1981**

| Month  | Extreme Gage Feet |      |     | Extreme Second-Feet     |      | Average Second-Feet | Total Acre-Feet           | Acre-Feet |         |         |  |  |
|--------|-------------------|------|-----|-------------------------|------|---------------------|---------------------------|-----------|---------|---------|--|--|
|        | High              |      | Low | High                    |      |                     |                           | Average   | Maximum | Minimum |  |  |
|        | High              | Low  |     | Day                     | Day  |                     |                           |           |         |         |  |  |
| Jan.   | 19                | 89.5 | 25  | 13.1                    | 40.4 | 2,487               | 7,688                     | 12,728    | 2,487   |         |  |  |
| Feb.   | 18                | 90.9 | 11  | 12.4                    | 40.2 | 2,232               | 6,492                     | 10,704    | 2,232   |         |  |  |
| Mar.   | 12                | 112  | 19  | 17.5                    | 50.8 | 3,124               | 8,745                     | 11,675    | 3,124   |         |  |  |
| Apr.   | 8                 | 86.4 | 28  | 35.0                    | 54.7 | 3,254               | 9,617                     | 14,646    | 3,254   |         |  |  |
| May    | 7                 | 103  | 13  | 24.3                    | 49.5 | 3,045               | 8,683                     | 14,327    | 3,045   |         |  |  |
| June   | 29                | 62.9 | 24  | 23.8                    | 37.4 | 2,224               | 9,244                     | 14,384    | 2,224   |         |  |  |
| July   | 8                 | 83.1 | 14  | 27.0                    | 44.4 | 2,728               | 8,914                     | 15,180    | 2,728   |         |  |  |
| Aug.   | 2                 | 68.7 | 28  | 24.0                    | 42.6 | 2,619               | 8,116                     | 11,586    | 2,619   |         |  |  |
| Sept.  | 4                 | 52.6 | 15  | 28.6                    | 37.0 | 2,200               | 6,639                     | 9,162     | 2,200   |         |  |  |
| Oct.   | 10                | 91.6 | 15  | 21.3                    | 48.2 | 2,966               | 6,379                     | 8,220     | 2,966   |         |  |  |
| Nov.   | 1                 | 77.3 | 3   | 26.3                    | 45.0 | 2,678               | 6,467                     | 10,790    | 2,678   |         |  |  |
| Dec.   | 15                | 86.1 | 23  | 26.9                    | 46.5 | 2,858               | 6,696                     | 12,797    | 1,369   |         |  |  |
|        |                   |      | 112 |                         | 12.4 | 44.8                | 32,415                    | 93,680    | 130,563 | 32,415  |  |  |
| Yearly | Meters            |      |     | Cubic Meters per Second |      |                     | Thousands of Cubic Meters |           |         |         |  |  |
|        |                   |      |     | 3.17                    | 0.35 | 1.27                | 39,984                    | 115,555   | 161,049 | 39,984  |  |  |

\*\* Period 1968-1981

θ Mean daily

**RIO GRANDE NEAR EL INDIO, TEXAS  
AND VILLA GUERRERO, COAHUILA**

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, and water-stage recorders (graphic and digital) located on the left bank at latitude 28°20'45", longitude 100°18'35", and river mile 460.4 (741.0 km), 0.6 river mile (0.9 km) downstream from Cuervo Creek, which marks the lower end of the Maverick County Water Control and Improvement District No. 1, 1.9 river miles (3.1 km) upstream from Tovar Creek, 5 miles (8.0 km) northeast of Villa Guerrero, Coahuila, about 11.5 miles (18.5 km) south of El Indio, Texas, and 35.9 river miles (57.8 km) downstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. The zero of the gage is 580.00 feet (176.78 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 24 discharge measurements during the year and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: March, April, May, October, November, and December 1952 with some days missing; January through August 20, 1953; September 23, 1953 through June 14, 1954; and May 27, 1955 through 1981 with several days missing prior to September 1955. Records prior to 1976 were published under the title "Rio Grande at San Antonio Crossing near El Indio, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 912,000 second-feet (25,800 m<sup>3</sup>/sec) in June 1954, determined by slope-area computation, with an elevation of 624.31 feet (190.29 m). Min. 54,4 second-feet (1.54 m<sup>3</sup>/sec) on June 24, 1953 with an elevation of 581.96 feet (177.38 m) at a station 1,700 feet (518 m) upstream from the present site.

| Average Flow in Second-Feet (Cubic Meters per Second)* |      |        |         |               |  |      |              |                    |  |  |  |
|--|------|--------|---------|---------------|--|------|--------------|--------------------|--|--|--|
| Daily:   | Max. | 96,400 | (2,730) | July 19, 1975 |  | Min. | 327 (9.26)   | June 29 & 30, 1972 |  |  |  |
| Monthly:   | Max. | 21,800 | (617)   | Sept. 1974    |  | Min. | 501 (14.2)   | June 1969          |  |  |  |
| Yearly:  | Max. | 5,300  | (150)   | 1974          |  | Min. | 1,230 (34.8) | 1972               |  |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day | Jan.   | Feb.   | March   | April  | May     | June    | July    | Aug.    | Sept.   | Oct.   | Nov.   | Dec.   |
|-----|--------|--------|---------|--------|---------|---------|---------|---------|---------|--------|--------|--------|
| 1   | 2,870  | 2,530  | 2,070   | 1,700  | 4,480   | 3,430   | 4,520   | 1,580   | 2,880   | 8,050  | 2,980  | 2,810  |
| 2   | 2,870  | 2,530  | 2,070   | 1,670  | 5,190   | 3,270*  | 4,450   | 1,490   | 2,800*  | 3,350  | 2,970  | 2,230* |
| 3   | 2,790  | 2,450  | 2,070*  | 2,030  | 6,320   | 2,470   | 4,410   | 1,470   | 2,890   | 2,360  | 2,850* | 2,360  |
| 4   | 2,790  | 2,610* | 2,070   | 2,340  | 5,260*  | 2,250   | 4,340   | 1,420   | 4,100   | 2,160  | 2,840  | 2,250  |
| 5   | 2,790  | 2,610  | 2,070   | 2,280  | 4,700   | 2,420   | 4,310   | 1,360*  | 4,770   | 2,070  | 2,840  | 2,250  |
| 6   | 2,720  | 2,610  | 2,070   | 2,310  | 4,240   | 4,030   | 4,310   | 1,370   | 4,800   | 2,020* | 2,840  | 2,330  |
| 7   | 2,790  | 2,610  | 2,070   | 2,320* | 3,920   | 3,640   | 4,340   | 1,190   | 4,940   | 4,560  | 2,740  | 2,330  |
| 8   | 2,790  | 2,530  | 2,070   | 2,380  | 3,880   | 3,430   | 4,340*  | 1,610   | 5,510   | 3,430  | 2,760  | 2,330  |
| 9   | 2,720  | 2,530  | 2,070   | 2,260  | 3,640   | 3,330   | 4,240   | 2,120   | 5,510   | 2,670  | 2,800  | 2,330  |
| 10  | 2,790  | 2,530  | 2,070   | 2,340  | 3,360   | 3,230   | 4,130   | 2,240   | 3,740   | 2,700  | 2,710  | 2,330  |
| 11  | 2,720  | 2,450  | 2,070   | 2,440  | 3,220   | 3,210   | 3,600   | 2,100   | 4,910   | 2,650  | 2,620  | 2,330  |
| 12  | 2,720  | 2,450  | 2,070   | 2,340  | 2,830   | 3,170   | 3,500   | 2,080   | 5,010   | 3,400  | 2,620  | 2,330  |
| 13  | 2,720  | 2,450  | 2,070   | 2,360  | 2,850   | 3,850   | 3,440   | 2,060   | 5,090   | 12,200 | 2,680  | 2,250  |
| 14  | 2,790* | 2,450  | 2,070   | 3,740  | 2,800   | 3,780   | 3,320   | 2,060   | 5,090   | 13,100 | 2,690  | 2,330  |
| 15  | 2,720  | 2,300  | 2,070   | 5,470  | 2,790   | 3,710   | 3,310   | 2,060   | 6,390*  | 12,900 | 2,750  | 2,330* |
| 16  | 2,640  | 2,230  | 2,070   | 4,660  | 2,730   | 8,090   | 3,170   | 2,400   | 8,650   | 13,100 | 2,780  | 2,330  |
| 17  | 2,640  | 2,300  | 2,070   | 4,940  | 2,960   | 10,400  | 2,460   | 2,620   | 8,830   | 11,200 | 2,690* | 2,330  |
| 18  | 2,490  | 2,230* | 2,070*  | 6,890  | 3,170   | 6,250*  | 3,130   | 2,670   | 8,900   | 7,880  | 2,660  | 2,330  |
| 19  | 2,490  | 2,230  | 2,070   | 8,370  | 2,890*  | 5,510   | 3,140   | 4,910*  | 9,010   | 7,700  | 2,680  | 2,330  |
| 20  | 2,720  | 2,230  | 2,040   | 6,850  | 2,420   | 5,160   | 3,180   | 6,820   | 9,040   | 7,950  | 2,640  | 2,330  |
| 21  | 2,790  | 2,230  | 2,070   | 6,110* | 2,100   | 4,940   | 3,080   | 6,960   | 9,180   | 8,370* | 2,620  | 2,330  |
| 22  | 2,790  | 2,160  | 2,080   | 6,750  | 2,020   | 4,800   | 3,000*  | 7,420   | 9,220   | 8,300  | 2,650  | 2,330  |
| 23  | 2,790  | 2,160  | 2,070   | 10,600 | 2,150   | 4,730   | 2,630   | 8,580   | 9,250   | 8,620  | 2,640  | 2,250  |
| 24  | 2,720  | 2,160  | 2,010   | 18,900 | 2,420   | 4,630   | 2,440   | 8,650   | 8,480   | 8,400  | 2,590  | 2,040  |
| 25  | 2,720  | 2,160  | 1,890   | 10,500 | 2,860   | 4,630   | 2,220   | 7,700   | 7,270   | 8,440  | 2,590  | 1,900  |
| Sum | 66,140 | 62,570 | 153,760 | 97,960 | 131,180 | 101,950 | 100,850 | 191,650 | 198,200 | 81,370 | 68,700 |        |
|     | 84,540 |        |         |        |         |         |         |         |         |        |        |        |

| Month  | Current Year 1981 |      |                     |                         |                     |       | Period 1968-1981          |           |           |
|--------|-------------------|------|---------------------|-------------------------|---------------------|-------|---------------------------|-----------|-----------|
|        | Extreme Gage Feet |      | Extreme Second-Feet |                         | Average Second-Feet | Total | Acre-Feet                 |           |           |
|        | High              | Low  | Day                 | Day                     |                     |       | Acre-Feet                 | Average   | Maximum   |
| Jan.   | 7.12              | 6.86 | 2                   | 2,950                   | 18                  | 2,730 | 167,626                   | 114,021   | 193,884   |
| Feb.   | 7.02              | 6.79 | 1 4                 | 2,610                   | 28                  | 2,360 | 131,111                   | 139,230   | 444,879   |
| Mar.   | 6.82              | 6.63 | 118                 | 2,150                   | 126                 | 1,730 | 2,020                     | 124,204   | 423,055   |
| Apr.   | 9.84              | 6.56 | 24                  | 23,000                  | 2                   | 1,600 | 5,120                     | 304,978   | 144,690   |
| May    | 8.33              | 6.66 | 3                   | 7,420                   | 122                 | 1,800 | 3,160                     | 194,327   | 361,567   |
| June   | 9.15              | 6.79 | 17                  | 14,400                  | 4                   | 1,980 | 4,380                     | 260,085   | 222,144   |
| July   | 7.71              | 6.53 | 1                   | 4,560                   | 31                  | 1,660 | 3,290                     | 184,106   | 473,653   |
| Aug.   | 8.50              | 6.23 | 123                 | 8,650                   | 7                   | 1,100 | 3,250                     | 202,242   | 788,688   |
| Sept.  | 8.60              | 6.76 | 123                 | 9,470                   | 4                   | 2,140 | 6,390                     | 218,396   | 824,033   |
| Oct.   | 9.02              | 6.53 | 14                  | 13,500                  | 6                   | 1,830 | 6,390                     | 380,115   | 523,230   |
| Nov.   | 7.09              | 6.92 | 1                   | 3,040                   | 111                 | 2,570 | 2,710                     | 161,356   | 163,172   |
| Dec.   | 7.15              | 6.63 | 1                   | 3,050                   | 130                 | 1,770 | 2,210                     | 136,224   | 29,808    |
|        | 9.84              | 6.23 |                     | 23,000                  |                     | 1,100 | 3,670                     | 2,655,491 | 77,224    |
| Yearly | Meters            |      |                     | Cubic Meters per Second |                     |       | Thousands of Cubic Meters |           |           |
|        | 3.00              | 1.90 |                     | 650                     |                     | 31.1  | 104                       | 3,275,514 | 4,731,400 |
|        |                   |      |                     |                         |                     |       |                           |           | 1,105,728 |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

**RIO GRANDE AT VILLA HIDALGO, COAHUILA  
NEAR LAREDO, TEXAS**

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the right bank on the outskirts of Palafox, Webb County, Texas and Villa Hidalgo, Coahuila at latitude  $27^{\circ}47'55''$ , longitude  $99^{\circ}52'40''$ , and river mile 406.0 (653.4 km) 1.9 river miles (3.1 km) downstream from Arroyo Agua Verde in Mexico, 13.1 river miles (21.1 km) upstream from Santa Tomas Creek in United States, and 45.1 river miles (72.6 km) upstream from the old international highway bridge between Laredo, Texas and Nuevo Laredo, Tamaulipas. The zero of the gage is 436.02 feet (132.90 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 27 discharge measurements during the year, 16 by the Mexican Section and 11 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. High flows prior to early 1962 were computed from a rating curve developed after the cableway was installed. Records available: August 1959 through 1981. Records prior to 1976 were published under the title "Rio Grande at Palafox near Laredo, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The recorder was installed on August 5, 1959 and the cableway in early 1962.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 214,000 second-feet ( $6,060 \text{ m}^3/\text{sec}$ ) on September 25, 1964 with a gage height of 42.06 feet (12.82 m). Min. 314 second-feet ( $8.90 \text{ m}^3/\text{sec}$ ) on June 30 and July 1, 1972 with a gage height of -0.66 foot (-0.20 m).

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                      |               |                   |              |
|----------|----------------------|---------------|-------------------|--------------|
| Daily:   | Max. 134,000 (3,800) | June 29, 1971 | Min. 314 (8.90)   | July 1, 1972 |
| Monthly: | Max. 21,000 (595)    | Sept. 1974    | Min. 434 (12.3)   | June 1969    |
| Yearly:  | Max. 5,470 (155)     | 1974          | Min. 1,270 (35.9) | 1972         |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.    | March   | April   | May     | June    | July    | Aug.    | Sept.   | Oct.     | Nov.    | Dec.    |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|
| 1          | 2,870   | 2,670   | 2,030   | 1,830   | 5,440   | 2,330   | 4,480 * | 1,910   | 2,770   | 7,310    | 2,970   | 2,660   |
| 2          | 2,920   | 2,650   | 2,120   | 1,740   | 6,500   | 4,980   | 4,410   | 1,680   | 2,750   | 5,260 *  | 2,980   | 2,730   |
| 3          | 2,950   | 2,650 * | 2,110   | 1,750   | 8,930   | 3,430 * | 4,340   | 1,580   | 3,000   | 2,580    | 2,970   | 2,420 * |
| 4          | 2,920   | 2,650   | 2,310   | 2,180   | 8,160   | 2,380   | 4,310   | 1,560   | 2,760   | 2,100    | 2,910   | 2,380   |
| 5          | 2,900   | 2,670   | 2,160 * | 2,310   | 5,760   | 2,290   | 4,270   | 1,480   | 4,590   | 2,000    | 2,930   | 2,340   |
| 6          | 2,870 * | 2,710   | 2,070   | 2,260 * | 4,770 * | 2,800   | 4,240   | 1,410 * | 4,700   | 1,980    | 2,910   | 2,380   |
| 7          | 2,870   | 2,670   | 2,030   | 2,290   | 4,100 * | 3,990   | 4,240   | 1,440   | 4,100   | 2,330    | 2,900   | 2,440   |
| 8          | 2,970   | 2,670   | 2,040   | 2,340   | 3,990   | 3,410   | 4,310   | 1,230   | 5,440   | 5,230    | 2,830   | 2,480   |
| 9          | 2,920   | 2,630   | 2,090   | 2,290   | 3,850   | 3,280   | 4,240   | 1,820   | 5,650   | 3,020    | 2,840   | 2,490   |
| 10         | 2,920   | 2,600   | 2,080   | 2,250   | 3,500   | 3,170   | 4,130   | 2,210   | 4,340   | 2,770    | 2,790   | 2,480   |
| 11         | 2,950   | 2,550   | 2,160   | 2,320   | 3,230   | 3,130   | 3,880   | 2,180   | 3,780   | 2,750    | 2,610 * | 2,510   |
| 12         | 2,950   | 2,440   | 2,260   | 2,340   | 3,100   | 3,240   | 3,400   | 2,120   | 4,700   | 2,690    | 2,550   | 2,520   |
| 13         | 2,870   | 2,420   | 2,340   | 2,320 * | 2,730   | 5,440   | 3,350   | 2,100   | 4,730   | 7,950    | 2,570   | 2,480   |
| 14         | 2,870   | 2,440   | 2,380   | 3,090   | 2,750   | 12,900  | 3,270   | 2,080   | 4,730   | 13,100 * | 2,610   | 2,480   |
| 15         | 2,900   | 2,460   | 2,340   | 16,300  | 2,720   | 23,900  | 3,170   | 2,100   | 4,770   | 13,100   | 2,650   | 2,500   |
| 16         | 2,820   | 2,250   | 2,280   | 9,430   | 2,690   | 15,100  | 3,150   | 2,120   | 7,630   | 13,100   | 2,670   | 2,540   |
| 17         | 2,740   | 2,250   | 2,260   | 5,900   | 2,660   | 9,780   | 2,840   | 2,440   | 8,370   | 13,000   | 2,630   | 2,490   |
| 18         | 2,770   | 2,270   | 2,180   | 6,390   | 2,990   | 9,680   | 2,520   | 2,500   | 8,720 * | 8,970    | 2,620   | 2,460   |
| 19         | 2,600   | 2,200   | 2,100   | 8,650   | 2,960   | 6,710   | 3,040   | 3,290   | 8,860   | 7,880    | 2,590 * | 2,440   |
| 20         | 2,620   | 2,180   | 2,090   | 7,630   | 2,730   | 5,620   | 3,030   | 5,930   | 8,900   | 7,840    | 2,590   | 2,480   |
| 21         | 2,920   | 2,160   | 2,070   | 6,600   | 2,290   | 5,230   | 3,030   | 6,920 * | 8,930   | 8,440    | 2,570   | 2,560   |
| 22         | 2,920   | 2,080   | 2,110   | 6,460   | 2,130   | 4,940   | 2,950   | 7,060   | 8,930   | 8,480    | 2,550   | 2,540   |
| 23         | 2,920   | 1,970   | 2,100   | 7,130   | 2,090   | 4,770   | 2,850   | 8,230   | 8,900   | 8,860    | 2,560   | 2,500   |
| 24         | 2,900   | 2,010   | 2,090   | 15,800  | 2,200   | 4,630   | 2,440   | 8,720   | 8,830   | 8,760    | 2,550   | 2,410   |
| 25         | 2,900   | 2,030   | 2,010   | 14,400  | 2,240   | 4,630   | 2,340   | 8,760   | 7,240   | 8,690    | 2,550   | 2,100   |
| 26         | 2,870   | 1,970   | 1,910   | 8,760   | 2,240   | 4,730   | 2,170   | 5,690   | 6,960   | 8,720    | 2,540   | 2,080   |
| 27         | 2,800   | 1,920   | 1,830   | 7,270   | 2,240   | 4,840   | 2,180   | 3,270   | 6,960   | 8,620    | 2,590   | 2,080   |
| 28         | 2,820   | 1,930   | 1,840   | 6,750   | 2,170   | 4,560   | 2,210   | 2,020   | 6,960   | 6,430    | 2,590   | 2,050   |
| 29         | 2,800   | —       | 1,900   | 6,460 * | 2,000   | 4,380   | 2,240   | 2,120   | 6,960   | 4,240    | 2,590   | 2,020   |
| 30         | 2,740   | —       | 1,920   | 5,090   | 2,190   | 4,410   | 2,210   | 2,260   | 6,180   | 3,140    | 2,660   | 1,980   |
| 31         | 2,670   | —       | 1,950   | —       | 2,200   | —       | 2,130   | 2,430   | 3,010   | 3,010    | —       | 1,960   |
| <b>Sum</b> | 66,100  | 170,330 | 174,680 | 100,660 | 202,350 | 73,980  |         |         |         |          |         |         |
|            | 88,460  | 65,160  | 107,550 | 101,370 | 182,140 | 80,870  |         |         |         |          |         |         |

| Month | Current Year 1981 |      |                     |                                |                     |                 | Period 1968-1981                 |           |           |
|-------|-------------------|------|---------------------|--------------------------------|---------------------|-----------------|----------------------------------|-----------|-----------|
|       | Extreme Gage Feet |      | Extreme Second-Feet |                                | Average Second-Feet | Total Acre-Feet | Acre-Feet                        |           |           |
|       | High              | Low  | Day                 | Day                            |                     |                 | Average                          | Maximum   | Minimum   |
| Jan.  | 3.02              | 2.69 | ! 7                 | 3,020                          | 20                  | 2,850           | 175,415                          | 115,898   | 200,876   |
| Feb.  | 2.82              | 2.17 | ! 5                 | 2,720                          | 1,870               | 2,360           | 131,062                          | 139,025   | 48,884    |
| Mar.  | 2.82              | 1.94 | 4                   | 2,720                          | 28                  | 1,770           | 2,100                            | 129,234   | 116,371   |
| Apr.  | 11.52             | 1.84 | 15                  | 21,100                         | 3                   | 1,680           | 5,690                            | 337,878   | 136,981   |
| May   | 6.63              | 2.13 | 3                   | 10,200                         | 23                  | 1,950           | 3,470                            | 213,260   | 611,076   |
| June  | 12.96             | 2.43 | 16                  | 24,600                         | 1 4                 | 2,270           | 5,830                            | 224,545   | 750,690   |
| July  | 3.90              | 2.20 | 1                   | 4,520                          | 31                  | 2,080           | 3,270                            | 201,093   | 238,216   |
| Aug.  | 6.07              | .95  | ! 24                | 8,930                          | 8                   | 1,120           | 3,250                            | 199,685   | 228,693   |
| Sept. | 6.10              | 2.33 | 24                  | 9,040                          | 4                   | 2,170           | 6,070                            | 361,238   | 730,503   |
| Oct.  | 8.20              | 2.03 | 14                  | 13,500                         | ! 4                 | 1,960           | 6,530                            | 401,416   | 276,374   |
| Nov.  | 2.95              | 2.56 | ! 1                 | 2,980                          | ! 14                | 2,500           | 2,690                            | 160,383   | 167,849   |
| Dec.  | 2.85              | 2.07 | 2                   | 2,870                          | 31                  | 1,930           | 2,390                            | 146,689   | 126,562   |
|       | 12.96             | 0.95 |                     | 24,600                         | 1,120               | 3,880           | 2,803,979                        | 2,314,723 | 3,963,062 |
|       | <b>Meters</b>     |      |                     | <b>Cubic Meters per Second</b> |                     |                 | <b>Thousands of Cubic Meters</b> |           |           |
|       | 3.95              | 0.29 |                     | 698                            | 31.8                | 110             | 3,458,670                        | 2,855,179 | 4,888,381 |
|       |                   |      |                     |                                |                     |                 |                                  |           | 1,135,961 |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

**RIO GRANDE AT NUEVO LAREDO, TAMAULIPAS AND LAREDO, TEXAS**

**DESCRIPTION:** Cableway, bubbler gage, and water-stage recorder located on the right bank at Laredo, Texas at latitude 27°29'45", longitude 99°29'25", and river mile 359.8 (579.0 km), immediately downstream from the Laredo, Texas sewage plant and 1.1 river mile (1.8 km) downstream from the old international highway bridge between Laredo, Texas and Nuevo Laredo, Tamaulipas. The zero of the gage is 345.28 feet (105.24 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 58 discharge measurements during the year, 46 by the Mexican Section and 12 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: May 1900 through 1913; May, June, and Oct. 1914; Sept. and Oct. 1917; Oct. 1918; Sept. and Oct. 1919; Aug. and Sept. 1920; June, Nov., and Dec. 1922; and 1923 through 1981. Gage height records are available for Jan., Feb., and Mar. 1914.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. This station was established in Jan. 1955 to replace the station 1.7 miles (2.7 km) upstream which was destroyed by the June-July 1954 flood. Prior to July 11, 1968 the recorder was located 0.2 river mile (0.3 km) upstream, where the cableway is still located, and the zero of the gage was 347.90 feet (106.04 m) above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 716,900 second-feet (20,300 m<sup>3</sup>/sec) on June 30, 1954, determined by slope-area calculations, with a gage height of 61.35 feet (18.70 m). Much well-authenticated information established the occurrence of a greater flood in June 1865 with a gage height of 62.5 feet (19.05 m) on the same gage and discharge of approximately 950,000 second-feet (27,000 m<sup>3</sup>/sec), and also that these were the only floods since 1745 with flows greater than 600,000 second-feet (17,000 m<sup>3</sup>/sec). Min. no flow several days in June and July 1953 and on July 24, 1956.

| Average Flow in Second-Feet (Cubic Meters per Second)** |      |         |         |               |      |       |        |              |  |  |  |
|---|------|---------|---------|---------------|------|-------|--------|--------------|--|--|--|
| Daily:  | Max. | 115,000 | (3,270) | June 30, 1971 | Min. | 247   | (7.00) | July 2, 1972 |  |  |  |
| Monthly:  | Max. | 20,400  | (579)   | Sept. 1974    | Min. | 498   | (14.1) | June 1969    |  |  |  |
| Yearly:   | Max. | 5,370   | (152)   | 1974          | Min. | 1,350 | (38.3) | 1972         |  |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day | Jan.    | Feb.    | March   | April    | May      | June     | July    | Aug.    | Sept.   | Oct.     | Nov.    | Dec.    |
|-----|---------|---------|---------|----------|----------|----------|---------|---------|---------|----------|---------|---------|
| 1   | 2,600   | 2,480   | 1,940   | 1,800    | 4,800    | 2,370 *  | 4,270   | 1,940   | 2,560   | 5,860    | 2,770   | 2,530 * |
| 2   | 2,650   | 2,480   | 1,940 * | 1,730    | 8,580    | 3,990    | 4,200   | 1,550   | 2,910   | 6,960    | 2,730   | 2,660   |
| 3   | 2,720   | 2,490   | 1,970   | 1,670    | 13,400   | 3,920    | 4,130   | 1,360 * | 6,290   | 3,150    | 2,730 * | 2,270   |
| 4   | 2,730   | 2,530   | 2,020   | 1,740    | 11,700 * | 2,830    | 4,100   | 1,280   | 3,570   | 2,100    | 2,690   | 2,370   |
| 5   | 2,690   | 2,480   | 2,110   | 2,030    | 7,170    | 2,320 *  | 3,960   | 1,260   | 3,920   | 1,840 *  | 2,660   | 2,200   |
| 6   | 2,630   | 2,540   | 2,000   | 2,050    | 5,470    | 2,340    | 3,960 * | 1,180   | 4,770   | 1,730    | 2,650   | 2,200   |
| 7   | 2,580   | 2,570   | 1,910   | 2,040    | 4,660    | 3,510    | 3,960   | 1,140   | 4,770   | 3,640    | 2,650   | 2,200   |
| 8   | 2,560 * | 2,550   | 1,900   | 2,050    | 4,060    | 3,530    | 7,270   | 1,160   | 4,770   | 5,050    | 2,620   | 2,290 * |
| 9   | 2,630   | 2,540 * | 1,940   | 2,080    | 4,030    | 3,170    | 4,560   | 1,110   | 5,690   | 3,740    | 2,580 * | 2,290 * |
| 10  | 2,590   | 2,480   | 1,990   | 2,040    | 3,780    | 3,010 *  | 4,030   | 1,830 * | 5,470 * | 2,610    | 2,580   | 2,330   |
| 11  | 2,600   | 2,440 * | 2,030   | 2,030    | 3,460 *  | 2,950    | 3,810   | 2,200   | 3,600   | 2,510    | 2,510   | 2,290   |
| 12  | 2,740   | 2,410   | 2,350   | 2,130    | 3,200    | 3,450    | 3,340   | 2,070   | 4,520   | 2,470    | 2,420   | 2,310   |
| 13  | 2,690   | 2,370   | 2,200   | 2,080 *  | 2,820    | 5,330    | 3,140 * | 2,040   | 4,800   | 3,430 *  | 2,400   | 2,310   |
| 14  | 2,590   | 2,390   | 2,230   | 2,090    | 2,630    | 7,490    | 3,100   | 2,030   | 4,840 * | 12,500 * | 2,410   | 2,310   |
| 15  | 2,610   | 2,420   | 2,230   | 13,400 * | 2,550    | 6,360 *  | 3,000   | 2,020   | 4,840   | 13,700 * | 2,440   | 2,330   |
| 16  | 2,580   | 2,290   | 2,200   | 11,800 * | 2,520    | 6,850    | 2,970   | 2,060   | 6,220   | 13,500   | 2,520   | 2,380   |
| 17  | 2,540   | 2,110 * | 2,190   | 7,060    | 2,450    | 20,500 * | 2,910 * | 2,160 * | 8,190   | 13,600   | 2,520   | 2,400   |
| 18  | 2,550   | 2,140   | 2,090   | 6,390    | 2,610 *  | 13,000 * | 2,380   | 2,510   | 8,400   | 11,000   | 2,450   | 2,380   |
| 19  | 2,710   | 2,120   | 2,010   | 7,880    | 2,950    | 7,490    | 2,750   | 2,680   | 8,400   | 7,840 *  | 2,450   | 2,360   |
| 20  | 2,360 * | 2,080   | 1,970 * | 8,550 *  | 2,710    | 6,040    | 2,860   | 4,840   | 8,480   | 7,660    | 2,460   | 2,360   |
| 21  | 2,440   | 2,080   | 1,950   | 7,350    | 2,300    | 5,300    | 2,860   | 6,710   | 8,480   | 7,950    | 2,460   | 2,400   |
| 22  | 2,730   | 2,040   | 1,940   | 7,100    | 2,020    | 4,980    | 2,810 * | 6,820   | 8,510   | 8,330    | 2,450   | 2,420   |
| 23  | 2,700   | 2,030 * | 1,970 * | 6,990    | 1,920    | 4,730    | 2,750   | 7,380   | 8,550   | 8,830    | 2,440   | 2,420   |
| 24  | 2,670   | 2,040   | 1,940   | 12,800 * | 2,070    | 4,590    | 2,560   | 8,550   | 8,580   | 8,830    | 2,440   | 2,360   |
| 25  | 2,650   | 1,970   | 1,920   | 18,500 * | 3,140    | 4,560 *  | 2,320   | 8,720 * | 7,520   | 8,620    | 2,390   | 2,250   |
| 26  | 2,630 * | 1,940   | 1,880   | 10,300   | 4,060 *  | 5,120    | 2,220   | 7,380   | 6,710   | 8,580    | 2,370   | 1,920   |
| 27  | 2,590   | 1,910   | 1,780   | 7,840 *  | 2,570    | 5,090    | 2,100 * | 4,060   | 6,750   | 8,550    | 2,390   | 1,910   |
| 28  | 2,550   | 1,880   | 1,740   | 6,990    | 2,130    | 4,590    | 2,130   | 2,450   | 6,750 * | 7,520    | 2,460   | 1,880 * |
| 29  | 2,560   |         | 1,780   | 6,670    | 1,940    | 4,450    | 2,130   | 2,000   | 6,710   | 5,260    | 2,440   | 1,880   |
| 30  | 2,530   |         | 1,810 * | 6,180    | 1,940    | 4,340    | 2,190   | 2,190   | 6,500   | 3,250    | 2,470   | 1,820   |
| 31  | 2,510   |         | 1,830   |          | 2,030    |          | 2,060   | 2,400 * |         | 2,880    |         | 1,840   |

|     |        |         |         |         |         |        |
|-----|--------|---------|---------|---------|---------|--------|
| Sum | 63,800 | 173,360 | 158,200 | 97,080  | 203,490 | 69,870 |
|     | 80,910 | 61,760  | 121,670 | 100,830 | 182,070 | 75,540 |

| Month  | Current Year 1981 |        |                     |                         | Period 1968-1981 |                           |           |
|--------|-------------------|--------|---------------------|-------------------------|------------------|---------------------------|-----------|
|        | Extreme Gage Feet |        | Extreme Second-Feet |                         | Total            | Acre-Feet                 |           |
|        | High              | Low    | Day                 | Day                     |                  | Average                   | Maximum   |
| Jan.   | 4.17              | 3.64   | 19                  | 3,210                   | 21               | 2,320                     | 2,610     |
| Feb.   | 3.81              | 3.12   | 6                   | 2,570                   | 28               | 1,840                     | 2,280     |
| Mar.   | 4.17              | 2.82   | 12                  | 3,190                   | 127              | 1,720                     | 1,990     |
| Apr.   | 13.25             | 2.69   | 25                  | 21,500                  | 3                | 1,630                     | 5,790     |
| May    | 10.96             | 2.99   | 3                   | 15,800                  | 29               | 1,820                     | 3,920     |
| June   | 14.11             | 3.28   | 17                  | 23,000                  | 1                | 2,240                     | 5,260     |
| July   | 10.56             | 3.05   | 8                   | 14,300                  | 31               | 1,970                     | 3,250     |
| Aug.   | 7.84              | 2.13   | 25                  | 8,860                   | 9                | 1,020                     | 3,130     |
| Sept.  | 8.43              | 3.48   | 3                   | 9,990                   | 1                | 2,450                     | 6,070     |
| Oct.   | 10.24             | 2.82   | 15                  | 14,000                  | 6                | 1,710                     | 6,570     |
| Nov.   | 3.81              | 3.44   | 1                   | 2,770                   | 26               | 2,350                     | 403,475   |
| Dec.   | 3.87              | 3.08   | 2                   | 2,850                   | 31               | 1,780                     | 2,260     |
| 14.11  | 2.13              |        | 23,000              |                         | 1,020            | 3,810                     | 2,754,203 |
| Yearly |                   | Meters |                     | Cubic Meters per Second |                  | Thousands of Cubic Meters |           |
|        |                   |        |                     |                         | 3,397,273        | 2,899,365                 | 4,799,588 |
|        | 4.30              | 0.65   |                     | 650                     | 29.0             | 108                       | 1,209,729 |

\*\* Period 1968-1981

\* Discharge measurement made on this day

! And other days

## RIO SALADO NEAR LAS TORTILLAS, TAMAULIPAS

**DESCRIPTION:** Cableway, control weir with notch opening of 2,500 second-foot ( $72 \text{ m}^3/\text{sec}$ ) capacity, gravity well, and water-stage recorder located on the right bank at latitude  $26^{\circ}50'10''$ , longitude  $99^{\circ}33'50''$ , 2.0 river miles (3 km) downstream from the confluence of Rio Sabinas with Rio Salado, 6 miles (10 km) southeast of the town of Las Tortillas, Tamaulipas, and 24.8 river miles (39.9 km) from the confluence with the Rio Grande. This stream enters the Rio Grande at river mile 299.5 (482.0 km), 24.7 river miles (39.8 km) upstream from Falcon Dam. The zero of the gage is 325.72 feet (99.28 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 14 discharge measurements during the year, a stable rating curve up to 2,500 second-feet ( $72 \text{ m}^3/\text{sec}$ ), and a continuous record of gage heights. Computations by shifting control methods for flows greater than 2,500 second-feet ( $72 \text{ m}^3/\text{sec}$ ). Records available: September 9, 1953 through 1981. Records are also available for a station at old Cd. Guerrero, 21.7 miles (35 km) downstream, from 1900 through 1913 and 1923 through September 8, 1953.

**REMARKS:** Reservoirs and irrigation diversions modify the flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 65,000 second-feet ( $1,840 \text{ m}^3/\text{sec}$ ) on September 16, 1971 with a gage height of 40.39 feet (12.31 m). Min. frequently no flow. The maximum discharge was measured at the highway bridge 13.0 river miles (20.9 km) downstream from the station. Extreme flow data for the Rio Salado at Cd. Guerrero prior to September 8, 1953 may be found in previous bulletins.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                     |                |                  |            |
|----------|---------------------|----------------|------------------|------------|
| Daily:   | Max. 62,900 (1,780) | Sept. 16, 1971 | Min. 0           | Frequently |
| Monthly: | Max. 13,600 (384)   | Sept. 1971     | Min. 0           | Frequently |
| Yearly:  | Max. 3,310 (93.6)   | 1971           | Min. 56.8 (1.61) | 1956       |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.    | Feb.  | March     | April   | May      | June   | July    | Aug.  | Sept. | Oct.  | Nov.    | Dec.  |
|------------|---------|-------|-----------|---------|----------|--------|---------|-------|-------|-------|---------|-------|
| 1          | 77.0    | 236   | 220       | * 97.1  | 6,920    | 2,980  | 2,080   | 424   | 374   | 149   | 160     | 117   |
| 2          | 77.0    | 238 * | 198       | 107     | 6,780    | 2,940  | 2,080   | 381   | 272   | 149   | 160     | 113   |
| 3          | 72.7    | 220   | 176 *     | 93.2    | 8,160    | 3,130  | 2,200 * | 334   | 551   | 149   | 160     | 113   |
| 4          | 56.5    | 236   | 149       | 109     | 9,390    | 3,230  | 2,270   | 292 * | 805 * | 149   | 160     | 133 * |
| 5          | * 43.8  | 225   | 121       | 106     | 10,700   | 2,960  | 2,200   | 256   | 572   | 149   | 143     | 126   |
| 6          | 43.8    | 231   | 113       | 109     | 12,100   | 2,900  | 2,340   | 242   | 374   | 149   | 138     | 121   |
| 7          | 50.1    | 225   | 185       | 130     | 13,400 * | 2,340  | 2,460 * | 225   | 301   | 158   | 138     | 121   |
| 8          | 48.0    | 231   | 149       | 130     | 13,700   | 865    | 2,200   | 225   | 231   | 353   | 138     | 113   |
| 9          | 54.4    | 294   | 118       | 126     | 8,860    | 343    | 2,140   | 220   | 203   | 1,190 | 138 *   | 130   |
| 10         | 56.5    | 770   | 119       | 121     | 6,390    | 323    | 2,080   | 214   | 198   | 526   | 149     | 130   |
| 11         | 48.0    | 805   | 230       | 133     | 6,430    | 392    | 1,990   | 203   | 182   | 337   | 149     | 117   |
| 12         | 64.6    | 823   | 292       | 143     | 6,290    | 611    | 2,020   | 203   | 192   | 225   | 143     | 101   |
| 13         | 130     | 678   | 301       | 149     | 6,040    | 1,140  | 2,020   | 203   | 182   | 182   | 143     | 109   |
| 14         | 171     | 353   | 236       | 149     | 4,840    | 1,150  | 1,980   | 209   | 171   | 171   | 143     | 121   |
| 15         | 149     | 274   | 187       | 727     | 4,590    | 671    | 1,940   | 203   | 165   | 160   | 138     | 126   |
| 16         | 134     | 274   | 160       | 4,870   | 4,480    | 720    | 1,900   | 225   | 160   | 143   | 138     | 112   |
| 17         | 138     | 274   | 133       | 5,930   | 4,480    | 3,400  | 1,860   | 209   | 165   | 138   | 138     | 99.2  |
| 18         | 149     | 272   | 105       | 8,190   | 4,450    | 7,100  | 1,840   | 198   | 160   | 143   | 138     | 112   |
| 19         | 154     | 371   | 117       | 8,830   | 4,450    | 12,500 | 1,810   | 230   | 165   | 160   | 130     | 100   |
| 20         | 149     | 350   | 121       | 6,500   | 3,230    | 11,700 | 1,840   | 650   | 165   | 184   | 130     | 94.6  |
| 21         | 165     | 301   | 130       | 6,070 * | 3,070 *  | 7,770  | 1,810   | 434   | 165   | 181   | 126     | 89.0  |
| 22         | 154     | 256   | 121       | 7,200   | 2,590    | 7,560  | 1,810   | 484   | 171   | 165   | 126     | 91.5  |
| 23         | 165     | 242   | 113       | 7,420   | 2,590    | 7,420  | 1,810   | 385   | 171   | 207   | 130     | 97.5  |
| 24         | 182     | 242   | 121       | 6,820   | 2,510    | 7,350  | 1,810   | 242   | 165   | 216   | 138     | 101   |
| 25         | 176     | 242   | 113       | 6,290   | 3,070    | 7,270  | 1,790   | 204   | 165   | 251   | 133     | 118   |
| 26         | 149     | 242   | 105       | 5,790   | 3,990    | 7,200  | 1,790   | 261   | 160   | 269   | 130     | 113   |
| 27         | 149     | 236   | 80.9      | 5,580   | 3,530    | 6,290  | 1,830   | 295   | 160   | 203   | 130     | 101   |
| 28         | 143     | 225   | 80.9      | 6,360   | 4,240    | 3,710  | 2,470   | 266   | 160   | 182   | 126     | 105   |
| 29         | 160     |       | 105       | 6,990   | 4,270    | 5,970  | 1,430   | 491   | 154   | 171   | 121     | 109   |
| 30         | 187     |       | 101       | 7,060   | 4,130    | 2,470  | 611     | 840   | 149   | 171   | 121     | 109   |
| 31         | 214     |       | 93.2      | 3,230   |          |        | 484     | 537   |       | 165   |         | 113   |
| <b>Sum</b> | 9,366   |       | 102,329.3 |         | 124,405  |        | 9,785   |       | 7,145 |       | 3,455.8 |       |
|            | 3,710.4 |       | 4,594.0   |         | 182,900  |        | 58,895  |       | 7,208 |       | 4,155   |       |

## Current Year 1981

## Period 1954-1981

| Month         | Extreme Gage Feet |      |     | Extreme Second-Feet     |     | Average Second-Feet | Total | Acre-Feet                 |         |             |
|---------------|-------------------|------|-----|-------------------------|-----|---------------------|-------|---------------------------|---------|-------------|
|               | High              | Low  | Day | High                    | Low |                     |       | Average                   | Maximum | Minimum     |
| Jan.          | 1.25              | 0.52 | 31  | 225                     | 1 5 | 39.6                | 120   | 7,355                     | 11,376  | 59,812      |
| Feb.          | 2.17              | 1.18 | 12  | 872                     | 4   | 203                 | 334   | 18,578                    | 9,092   | 66,880      |
| Mar.          | 1.44              | .72  | 112 | 319                     | 27  | 72.7                | 148   | 9,117                     | 5,350   | 29,690      |
| Apr.          | 8.60              | .72  | 19  | 9,530                   | 3   | 72.7                | 3,410 | 202,979                   | 13,578  | 202,979     |
| May           | 13.06             | 3.08 | 8   | 14,100                  | 21  | 2,140               | 5,900 | 362,793                   | 30,266  | 362,793     |
| June          | 13.12             | 1.38 | 19  | 14,100                  | 1 9 | 283                 | 4,130 | 246,821                   | 33,391  | 246,821     |
| July          | 3.51              | 1.67 | 28  | 3,110                   | 31  | 452                 | 1,900 | 116,843                   | 35,994  | 441,541     |
| Aug.          | 2.33              | 1.15 | 30  | 1,050                   | 118 | 192                 | 316   | 19,414                    | 26,466  | 210,031     |
| Sept.         | 2.23              | 1.02 | 4   | 939                     | 30  | 149                 | 240   | 14,295                    | 95,258  | 807,616     |
| Oct.          | 2.79              | .98  | 9   | 1,670                   | 116 | 138                 | 230   | 14,161                    | 62,698  | 550,739     |
| Nov.          | 1.05              | .89  | 1   | 160                     | 129 | 113                 | 138   | 8,235                     | 32,574  | 338,000     |
| Dec.          | .98               | .75  | 18  | 138                     | 22  | 80.9                | 112   | 6,863                     | 21,104  | 176,100     |
| <b>Yearly</b> | 13.12             | 0.52 |     | 14,100                  |     | 39.6                | 1,430 | 1,027,454                 | 377,147 | 2,400,553.5 |
|               | Meters            |      |     | Cubic Meters per Second |     |                     |       | Thousands of Cubic Meters |         |             |
|               | 4.00              | 0.16 |     | 400                     |     | 1.12                | 40.2  | 1,267,352                 | 465,206 | 2,961,050   |
|               |                   |      |     |                         |     |                     |       |                           | 50,859  |             |

\*\* Period September 1953-1981

\* Discharge measurement made on this day

! And other days

**RIO GRANDE BELOW FALCON DAM NEAR FALCON, TEXAS  
AND NUEVA CD. GUERRERO, TAMAULIPAS**

**DESCRIPTION:** The discharges reported below represent water measured as it leaves Falcon Reservoir through turbine penstocks, bypass valves, spillway gates, and leakage. Falcon Dam, astride the Rio Grande, is located at latitude 26° 33' 35", longitude 99° 10' 00", and river mile 274.8 (442.3 km); about 7 miles (11.3 km) southwest of Falcon, Texas, and 66.1 river miles (138.6 km) downstream from the old international highway bridge between Laredo, Texas, and Nuevo Laredo, Tamaulipas. A gravity well and water-stage recorder located 2.5 river miles (4.1 km) downstream and a cableway located one mile (1.6 km) farther downstream are used to measure the flow of this station at times when spillway gates are in operation.

**RECORDS:** Based on daily Simplex meter records of releases through the six turbines, established rating curves for the four hollow-jet bypass valves, estimates of gate leakage, and measurements of flow at the cable during spillgate operations. During 1981 there were 8 discharge measurements made by the United States Section of the Commission. Records available: 1958 through 1981. Records are also available from December 17, 1952 through 1957 for a station at Chapeno, 2.6 miles (4.1 km) downstream, where discharges included arroyo inflow below Falcon Dam, which inflow is eliminated from the records reported below.

**REMARKS:** Computation of flow was made jointly by the United States and Mexican Sections of the Commission from a consolidation of the basic data gathered by each Section incident to the international operation of Falcon Reservoir.

**EXTREME FLOWS FROM RECORDS:\*\* Momentary: Max. 82,600 second-feet (2,340 m<sup>3</sup>/sec) on September 18, 1971. Min. 1.5 second-feet (0.04 m<sup>3</sup>/sec) on March 24 and 25, 1957 (at Chapeno gaging station).**

Average Flow in Second-Feet (Cubic Meters per Second)\*

|          |                     |                |                   |                     |
|----------|---------------------|----------------|-------------------|---------------------|
| Daily:   | Max. 76,400 (2,160) | Sept. 18, 1971 | Min. 1.5 (0.04)   | March 24 & 25, 1957 |
| Monthly: | Max. 32,500 (920)   | Oct. 1958      | Min. 23.5 (0.67)  | November 1973       |
| Yearly:  | Max. 6,930 (196)    | 1958           | Min. 1,580 (44.7) | 1970                |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.            | Feb.            | March | April          | May      | June             | July   | Aug.             | Sept. | Oct.          | Nov.  | Dec.  |
|------------|-----------------|-----------------|-------|----------------|----------|------------------|--------|------------------|-------|---------------|-------|-------|
| 1          | 364             | 367             | 1,350 | 2,120          | 6,250    | 8,330            | 14,400 | 2,860            | 18.0  | 5,690         | 2,100 | 2,130 |
| 2          | 374             | 558             | 1,180 | 2,450          | 6,820    | 8,330            | 14,500 | 3,230            | 18.0  | 5,650         | 2,120 | 2,150 |
| 3          | 992             | 562             | 1,050 | 2,690          | 6,290    | 8,230            | 14,300 | 3,230            | 18.0  | 3,570         | 1,820 | 2,130 |
| 4          | 1,120           | 335             | 1,000 | 2,200          | 6,780    | 8,330            | 11,300 | 3,400            | 18.0  | 3,530         | 1,040 | 2,130 |
| 5          | 1,200           | 299             | 752   | 2,220          | 8,230    | 8,400            | 7,380  | 3,920            | 2,370 | 2,630         | 717   | 2,150 |
| 6          | 1,820           | 410             | 1,050 | 2,570          | 8,190    | 8,370            | 7,420  | 4,240            | 3,360 | 1,610         | 699   | 2,130 |
| 7          | 2,180           | 406             | 1,410 | 3,170          | 11,600   | 8,400            | 8,400  | 4,660            | 3,920 | 1,430         | 710   | 2,120 |
| 8          | 3,050           | 399             | 1,430 | 3,530          | 14,300   | 4,060            | 8,440  | 5,260            | 4,270 | 2,130         | 1,030 | 2,130 |
| 9          | 2,380           | 403             | 1,570 | 3,810          | 14,000   | 3,480            | 12,200 | 5,230            | 5,690 | 3,600         | 2,080 | 2,130 |
| 10         | 2,190           | 622             | 1,130 | 3,990          | 14,200   | 3,170            | 14,500 | 4,700            | 5,930 | 4,270         | 2,120 | 2,130 |
| 11         | 1,960           | 364             | 191   | 4,130          | 14,200 * | 2,870            | 14,500 | 4,800            | 6,180 | 4,800         | 2,150 | 2,130 |
| 12         | 713             | 374             | 18.2  | 4,170          | 14,200 * | 3,180            | 14,300 | 4,800            | 5,690 | 5,540         | 2,150 | 2,130 |
| 13         | 18.2            | 371             | 18.2  | 4,240          | 14,200   | 4,100            | 11,300 | 4,590            | 4,310 | 7,700         | 2,140 | 2,130 |
| 14         | 18.2            | 367             | 18.2  | 4,410          | 14,200   | 6,390            | 5,690  | 4,240            | 2,680 | 8,440         | 2,140 | 2,150 |
| 15         | 830             | 374             | 18.2  | 4,560          | 14,200   | 6,640            | 18.0   | 4,410            | 2,070 | 7,950         | 2,130 | 2,140 |
| 16         | 509             | 2,180           | 308   | 4,380          | 14,200   | 8,330            | 2,000  | 4,410            | 4,200 | 6,250         | 2,120 | 2,160 |
| 17         | 876             | 2,040           | 334   | 3,710          | 14,200   | 8,400            | 2,520  | 4,410            | 4,480 | 4,910         | 2,150 | 2,150 |
| 18         | 724             | 2,180           | 501   | 4,520          | 14,200   | 12,100           | 2,020  | 4,380            | 4,910 | 3,510         | 2,150 | 2,160 |
| 19         | 540             | 2,400           | 788   | 4,480          | 14,200   | 14,500           | 2,020  | 4,380            | 5,720 | 2,810         | 2,150 | 2,130 |
| 20         | 374             | 2,360           | 851   | 4,410          | 14,200   | 14,500           | 2,560  | 4,030            | 5,690 | 2,840         | 2,120 | 2,140 |
| 21         | 378             | 2,380           | 607   | 5,230          | 14,200   | 14,500           | 2,280  | 3,810            | 6,390 | 3,190         | 2,130 | 2,130 |
| 22         | 374             | 1,010           | 614   | 6,140          | 14,200   | 14,500           | 2,480  | 3,880            | 7,520 | 4,840         | 2,160 | 2,140 |
| 23         | 385             | 992             | 742   | 6,960          | 13,900   | 14,500 *         | 2,490  | 3,850            | 7,840 | 7,100         | 2,150 | 2,130 |
| 24         | 371             | 996             | 1,290 | 5,400          | 13,000   | 14,500           | 2,500  | 3,360            | 7,840 | 7,170         | 2,130 | 2,120 |
| 25         | 378             | 1,010           | 1,070 | 3,990          | 11,900   | 14,500           | 2,510  | 2,710            | 7,840 | 7,130         | 2,130 | 2,130 |
| 26         | 378             | 1,020           | 1,290 | 4,340          | 10,900   | 14,500           | 2,480  | 2,090            | 7,800 | 7,770         | 2,130 | 2,130 |
| 27         | 374             | 999             | 1,860 | 3,530          | 9,960    | 14,000           | 2,490  | 1,740            | 6,850 | 8,300         | 2,150 | 2,130 |
| 28         | 374             | 1,190           | 2,050 | 3,400          | 9,040 *  | 13,500           | 2,510  | 975              | 5,690 | 7,800         | 2,130 | 2,120 |
| 29         | 367             | 2,040           | 4,560 | 8,330          | 14,000   | 2,510            | 770    | 5,690            | 6,320 | 2,130         | 2,130 | 2,130 |
| 30         | 374             | 1,510           | 5,440 | 8,330          | 14,400   | 2,530            | 325    | 5,650            | 4,560 | 2,150         | 2,130 | 2,130 |
| 31         | 18.2            | 1,540           | 8,300 |                |          |                  | 2,510  | 18.0             | 2,800 |               |       |       |
| <b>Sum</b> | <b>26,968</b>   | <b>120,750</b>  |       | <b>293,010</b> |          | <b>108,708.0</b> |        | <b>155,840</b>   |       | <b>66,170</b> |       |       |
|            | <b>26,003.6</b> | <b>29,580.8</b> |       | <b>360,720</b> |          | <b>197,058.0</b> |        | <b>140,652.0</b> |       | <b>57,226</b> |       |       |

| Month  | Current Year 1981 |     |                                |        | Period #1954-1981   |                 |                                  |           |           |
|--------|-------------------|-----|--------------------------------|--------|---------------------|-----------------|----------------------------------|-----------|-----------|
|        | Extreme Gage Feet |     | Extreme Second-Feet            |        | Average Second-Feet | Total Acre-Feet | Acre-Feet                        |           |           |
|        | High              | Low | Day                            | Day    |                     |                 | Average                          | Maximum   | Minimum   |
| Jan.   |                   |     | 8                              | 3,050  | 113                 | 18.2            | 837                              | 51,555    | 207,534   |
| Feb.   |                   |     | 19                             | 2,400  | 5                   | 299             | 964                              | 53,491    | 162,008   |
| Mar.   |                   |     | 28                             | 2,050  | 112                 | 18.2            | 953                              | 58,699    | 139,503   |
| Apr.   |                   |     | 23                             | 6,960  | 1                   | 2,120           | 4,030                            | 239,527   | 257,089   |
| May    |                   |     | 8                              | 14,300 | 1                   | 6,250           | 11,600                           | 715,233   | 503,683   |
| June   |                   |     | 119                            | 14,500 | 11                  | 2,870           | 9,780                            | 581,503   | 715,233   |
| July   |                   |     | 2                              | 14,500 | 15                  | 18.0            | 6,360                            | 391,071   | 145,284   |
| Aug.   |                   |     | 8                              | 5,260  | 31                  | 18.0            | 3,510                            | 215,629   | 1,478,678 |
| Sept.  |                   |     | 123                            | 7,840  | 1                   | 18.0            | 4,700                            | 278,979   | 183,745   |
| Oct.   |                   |     | 14                             | 8,440  | 7                   | 1,430           | 5,010                            | 309,124   | 1,080,871 |
| Nov.   |                   |     | 22                             | 2,160  | 6                   | 699             | 1,910                            | 113,516   | 245,148   |
| Dec.   |                   |     | 116                            | 2,160  | 1                   | 2,120           | 2,130                            | 131,230   | 115,781   |
|        |                   |     | 14,500                         |        | 18.0                | 4,340           | 3,139,557                        | 2,406,957 | 5,016,800 |
| Yearly | <b>Meters</b>     |     | <b>Cubic Meters per Second</b> |        |                     |                 | <b>Thousands of Cubic Meters</b> |           |           |
|        |                   |     | 412                            | 0.51   | 123                 | 3,872,601       | 2,968,979                        | 6,188,223 | 1,410,885 |

\*\* Period 1954-1981      \* Discharge measurement made on this day      # Mean daily

I And other days      # Values prior to 1958 are Chapeno discharge less arroyo inflow

## RIO ALAMO AT CD. MIER, TAMAULIPAS

**DESCRIPTION:** Cableway, reinforced concrete weir of 177 second-foot ( $5 \text{ m}^3/\text{sec}$ ) capacity, gravity well, and water-stage recorder located on the right bank at a point called "El Paso del Cantaro", latitude  $26^\circ 27' 00''$ , longitude  $99^\circ 09' 05''$ , about 0.5 mile (1 km) north of Cd. Mier, Tamaulipas, and 5.0 river miles (8 km) from the confluence with the Rio Grande. This stream enters the Rio Grande at river mile 262.4 (422.3 km), 12.4 river miles (20.0 km) downstream from Falcon Dam. The weir is located about 300 feet (91 m) downstream from the recorder. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 2 discharge measurements made at high flows during the year, the weir discharge table at low flows, and a continuous record of gage heights. High flow computations by shifting control methods. Records available: July 1923 through 1981.

**REMARKS:** Small reservoirs and irrigation diversions modify the flow of this spring-fed stream at this station. On June 11, 1952, the zero of the gage was raised 1.31 feet (0.40 m) to make it coincide with the weir crest elevation. Prior to January 1, 1969, the zero of the gage was 188.35 feet (57.41 m) above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 144,800 second-feet ( $4,100 \text{ m}^3/\text{sec}$ ) on September 11, 1948 with a gage height of 33.56 feet (10.23 m). Min. periods of no flow have occurred at times during all years of record except 1934, 1935, 1968, 1972, 1974, 1976, 1977, 1979, and 1981.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                     |                |                  |            |
|----------|---------------------|----------------|------------------|------------|
| Daily:   | Max. 87,230 (2,470) | Sept. 11, 1948 | Min. 0           | Frequently |
| Monthly: | Max. 7,310 (207)    | Sept. 1967     | Min. 0           | Frequently |
| Yearly:  | Max. 837 (23.7)     | 1967           | Min. 16.4 (0.47) | 1929       |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan. | Feb.  | March | April   | May   | June     | July | Aug.    | Sept. | Oct.    | Nov. | Dec.   |
|------------|------|-------|-------|---------|-------|----------|------|---------|-------|---------|------|--------|
| 1          | 4.2  | 13.1  | 18.7  | 13.1    | 30.7  | 62.9     | 43.8 | 21.5    | 61.8  | 18.7    | 24.7 | 31.1   |
| 2          | 4.2  | 13.1  | 18.7  | 15.9    | 26.1  | 127      | 33.9 | 15.9    | 37.8  | 17.3    | 24.7 | 27.9   |
| 3          | 4.2  | 13.1  | 18.7  | 8.1     | 5,050 | 251      | 27.9 | 15.9    | 43.4  | 15.9    | 24.7 | 27.9   |
| 4          | 4.2  | 13.1  | 18.7  | 6.0     | 4,450 | 984      | 24.7 | 13.1    | 327   | 13.1    | 26.1 | 27.9   |
| 5          | 4.2  | 15.9  | 17.0  | 6.0     | 367   | 166      | 21.5 | 13.1    | 109   | 10.6    | 26.1 | 27.9   |
| 6          | 4.2  | 15.9  | 17.0  | 6.0     | 47.7  | 77.3     | 494  | 13.1    | 66.0  | 8.1     | 26.1 | 27.9   |
| 7          | 4.2  | 15.9  | 17.0  | 4.2     | 21.5  | 133      | 99.9 | 13.1    | 45.2  | 16.2    | 26.1 | 27.9   |
| 8          | 4.2  | 15.9  | 15.9  | 4.2     | 13.1  | 116      | 50.5 | 13.1    | 29.3  | 12.0    | 27.9 | 27.9   |
| 9          | 4.2  | 15.9  | 13.1  | 4.2     | 8.8   | 68.5     | 37.1 | 43.4    | 24.0  | 12.0    | 26.1 | 27.9   |
| 10         | 4.2  | 13.1  | 18.7  | 4.2     | 6.7   | 44.8     | 62.2 | 29.0    | 51.6  | 8.1     | 26.1 | 31.1   |
| 11         | 4.2  | 13.1  | 21.5  | 4.2     | 4.9   | 50.9     | 84.0 | 10.6    | 41.0  | 8.1     | 24.7 | 31.1   |
| 12         | 4.2  | 13.1  | 27.5  | 2.5     | 4.2   | 99.6     | 38.5 | 8.1     | 22.2  | 12.7    | 26.1 | 27.9   |
| 13         | 8.1  | 13.1  | 27.5  | 2.5     | 3.5   | 35.3     | 29.3 | 8.1     | 18.7  | * 15.2  | 27.9 | 31.1   |
| 14         | 8.1  | 15.9  | 24.7  | 2.5     | 2.5   | 25.8     | 26.1 | 8.1     | 18.7  | * 12.4  | 31.1 | 33.9   |
| 15         | 8.1  | 18.7  | 21.5  | 2.5     | 908   | 125      | 24.7 | 8.1     | 18.7  | 10.6    | 31.1 | 33.9   |
| 16         | 8.1  | 18.7  | 21.5  | 643     | 858   | 554      | 21.5 | 8.1     | 36.0  | 9.2     | 27.9 | 27.9   |
| 17         | 8.1  | 18.7  | 20.1  | 551     | 165   | 1,490    | 17.3 | 8.1     | 162   | 8.1     | 31.1 | 23.3   |
| 18         | 8.1  | 18.7  | 18.7  | 304     | 94.3  | 286      | 12.0 | 8.1     | 159   | 10.9    | 40.6 | 27.9   |
| 19         | 10.6 | 18.7  | 18.7  | 63.2    | 69.2  | 126      | 10.6 | 24.4    | 43.4  | 27.5    | 35.3 | 26.1   |
| 20         | 18.7 | 18.7  | 18.7  | 28.6    | 109   | 94.6     | 8.1  | 65.3    | 23.3  | 39.9    | 27.9 | 27.9   |
| 21         | 18.7 | 18.7  | 18.7  | 19.8    | 49.4  | 72.0     | 8.1  | 24.0    | 21.5  | 19.4    | 26.1 | * 31.1 |
| 22         | 18.7 | 18.7  | 201   | 42.4    | 55.4  | 8.1      | 18.0 | 21.5    | 16.6  | 26.1    | 27.9 | 27.9   |
| 23         | 15.9 | 15.9  | 18.7  | 218     | 38.8  | 43.8     | 6.0  | 172     | 20.1  | 29.0    | 26.1 | 26.1   |
| 24         | 15.9 | 15.9  | 17.0  | 217     | 35.3  | 38.8     | 6.0  | 13.1    | 20.1  | 43.1    | 26.1 | 26.1   |
| 25         | 13.1 | 15.9  | 17.0  | 459     | 158   | 50.1     | 6.0  | 20.8    | 18.7  | 39.9    | 26.1 | 31.1   |
| 26         | 13.1 | 18.7  | 18.7  | 184     | 37.4  | 329      | 7.1  | 19.8    | 18.7  | 31.1    | 24.7 | 27.9   |
| 27         | 13.1 | 18.7  | 18.7  | 36.0    | 33.9  | 558      | 819  | 22.6    | 3.5   | 26.1    | 24.7 | 27.9   |
| 28         | 13.1 | 18.7  | 17.0  | 19.4    | 27.9  | 110      | 576  | 66.7    | 2.5   | 27.9    | 24.7 | 27.9   |
| 29         | 13.1 | 17.0  | 15.9  | 371     | 95.3  | 59.3     | 295  | 4.2     | 27.9  | 27.9    | 26.1 | 26.1   |
| 30         | 13.1 | 17.0  | 14.5  | 1,790   | 54.4  | 24.7     | 385  | 18.7    | 26.1  | 31.1    | 24.7 | 27.9   |
| 31         | 13.1 | 17.0  | 17.0  | 160     | 24.7  | 166      |      |         | 26.1  |         |      |        |
| <b>Sum</b> |      | 453.6 |       | 3,060.5 |       | 6,304.5  |      | 1,551.2 |       | 599.8   |      | 881.1  |
|            |      | 289.2 |       | 589.4   |       | 14,984.3 |      | 2,712.6 |       | 1,487.6 |      | 825.9  |

## Current Year 1981

## Period 1924-1981

| Month         | Extreme Gage Feet |        | Extreme Second-Feet            |       | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |         |           |
|---------------|-------------------|--------|--------------------------------|-------|---------------------|----------------------------------|-----------|---------|-----------|
|               | High              | Low    | Day                            | Day   |                     |                                  | High      | Maximum | Minimum   |
| Jan.          | 188.65            | 188.45 | 120                            | 18.7  | 1 1                 | 4.2                              | 9.2       | 574     | 3,376     |
| Feb.          | 188.65            | 188.58 | 115                            | 18.7  | 1 1                 | 13.1                             | 16.2      | 899     | 2,493     |
| Mar.          | 188.71            | 188.58 | 112                            | 27.5  | 9                   | 13.1                             | 19.1      | 1,169   | 2,501     |
| Apr.          | 191.27            | 188.42 | 16                             | 1,550 | 112                 | 2.5                              | 102       | 6,069   | 5,759     |
| May           | 195.41            | 188.42 | 4                              | 8,120 | 113                 | 2.5                              | 484       | 29,715  | 36,210    |
| June          | 192.06            | 188.68 | 16                             | 2,680 | 15                  | 20.1                             | 210       | 12,513  | 137,000   |
| July          | 191.24            | 188.48 | 27                             | 1,520 | 23                  | 6.0                              | 87.6      | 5,381   | 83,240    |
| Aug.          | 190.26            | 188.52 | 29                             | 544   | 112                 | 8.1                              | 50.1      | 3,077   | 7,796     |
| Sept.         | 190.39            | 188.42 | 14                             | 657   | 28                  | 2.5                              | 49.4      | 2,951   | 62,246    |
| Oct.          | 188.98            | 188.52 | 123                            | 59.0  | 1 6                 | 8.1                              | 19.4      | 1,190   | 205,700   |
| Nov.          | 188.85            | 188.71 | 18                             | 40.6  | 1 1                 | 24.7                             | 27.5      | 1,639   | 15,655    |
| Dec.          | 188.78            | 188.71 | 114                            | 33.9  | 17                  | 23.3                             | 28.3      | 1,748   | 0         |
|               | 195.41            | 188.42 |                                | 8,120 |                     | 2.5                              | 92.5      | 66,925  | 605,678.4 |
| <b>Yearly</b> | <b>Meters</b>     |        | <b>Cubic Meters per Second</b> |       |                     | <b>Thousands of Cubic Meters</b> |           |         |           |
|               | 59.56             | 57.43  |                                | 230   |                     | 0.07                             | 2.62      | 82,552  | 157,859   |
|               |                   |        |                                |       |                     |                                  |           | 747,096 | 14,686    |

\*\* Period 1924-1981

\* Discharge measurement made on this day

! And other days

**CONTRIBUTIONS TO THE RIO GRANDE FROM  
THE LOWER RIO SAN JUAN IRRIGATION DISTRICT  
FALCON DAM TO RIO GRANDE CITY**

**DESCRIPTION:** The Lower Rio San Juan Irrigation District in Mexico lies along the Rio Grande between Cd. Miguel Aleman and Rio Bravo, Tamaulipas and is irrigated with water impounded by Marte R. Gomez Dam situated on the Rio San Juan 12.4 river miles (20 km) upstream from the confluence with the Rio Grande. The Rio San Juan enters the Rio Grande at river mile 238.7 (384.1 km). Drain water from this irrigation district enters the Rio Grande between Falcon Dam and the Rio Grande City Gaging Station through the Rio San Juan channel, Rancherias Drain, and Los Fresnos Drain; and between this station and Anzaiduas Dam through Puertocticos, Los Indios, Huizache, and Morillo Drains. Only the portion of water reaching the Rio Grande via drains located upstream from the Rio Grande City Gaging Station is shown below. Drain water reaching the Rio Grande through the Rio San Juan channel is included in the Rio San Juan tabulation. The portion of drain water from this irrigation district reaching the Rio Grande via channels located downstream from the Rio Grande City Gaging Station is shown on page 67 in this bulletin.

RECORDS: Water entering the Rio Grande through the Rio San Juan Channel, composed of spills and leakage from Marte R. Gomez Dam, storm inflow and drainage below the dam, is measured at the Rio San Juan Gaging Station at Camargo, Tamaulipas, 3.1 river miles (5 km) upstream from the confluence with the Rio Grande. The discharge through Rancherias Drain was determined by prorating between 48 current meter measurements made during the year. There were no drainage flows through Los Fresnos Drain in 1981. All storm water measured at these two drains was deducted and is not included in the tabulation below. Records available: 1953 through 1981. Records prior to 1976 include Rio San Juan flow.

REMARKS: In 1981 there were 100,767 irrigable acres (40,779 ha) in the Lower Rio San Juan Irrigation District.

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Current Year 1981 |                   |      |                         |      |                     |                           |           | Period 1954-1981 |         |         |   |
|-------------------|-------------------|------|-------------------------|------|---------------------|---------------------------|-----------|------------------|---------|---------|---|
| Month             | Extreme Gage Feet |      | θ Extreme Second-Foot   |      | Average Second-Foot | Total Acre-Feet           | Acre-Feet |                  |         |         |   |
|                   | High              | Low  | Day                     | High |                     |                           | Day       | Average          | Maximum | Minimum |   |
| Jan.              |                   | 1    | 1.4                     | 1    | 4                   | 1.1                       | 1.1       | 73.8             | 169     | 556     | 0 |
| Feb.              |                   | 8    | 2.1                     | 124  | 1                   | 1.8                       | 1.8       | 96.5             | 290     | 938     | 0 |
| Mar.              | 116               | 2.1  | 1                       | 1    | 1.1                 | 1.8                       | 101       | 233              | 771     | 25.9    |   |
| Apr.              | 1                 | 1.1  | 1                       | 1    | 1.1                 | 1.1                       | 63.2      | 284              | 708     | 19.5    |   |
| May               | 31                | 2.5  | 1                       | 1    | 1.1                 | 1.4                       | 80.3      | 572              | 1,454   | 61.6    |   |
| June              | 24                | 9.5  | 1                       | 2.5  | 6.0                 | 6.0                       | 359       | 516              | 1,257   | 55.9    |   |
| July              | 5                 | 5.7  | 128                     | 2.8  | 4.2                 | 2.8                       | 263       | 256              | 525     | 32.4    |   |
| Aug.              | 16                | 6.4  | 26                      | 2.8  | 4.6                 | 4.6                       | 289       | 199              | 443     | 25.9    |   |
| Sept.             | 30                | 13.1 | 1                       | 9    | 4.6                 | 6.0                       | 363       | 216              | 697     | 15.4    |   |
| Oct.              | 1                 | 12.7 | 115                     | 3.5  | 6.7                 | 6.7                       | 408       | 198              | 797     | 19.5    |   |
| Nov.              | 1                 | 4.9  | 129                     | 2.8  | 3.9                 | 3.9                       | 237       | 186              | 641     | 6.5     |   |
| Dec.              | 130               | 3.5  | 122                     | 1.8  | 2.5                 | 2.5                       | 157       | 164              | 495     | 29.2    |   |
|                   |                   |      | 13.1                    | 1.1  | 3.4                 | 2,110.8                   | 3,283     | 6,786            | 490     |         |   |
| Yearly            | Meters            |      | Cubic Meters per Second |      |                     | Thousands of Cubic Meters |           |                  |         |         |   |
|                   |                   |      | 0.37                    | 0.03 | 0.10                | 3,073                     | 4,048     | 8,370            | 605     |         |   |

\* Discharge measurement made on this day

Ø Mean daily

## ! And other days

## RIO SAN JUAN AT CAMARGO, TAMAULIPAS

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank opposite Camargo, Tamaulipas at latitude 26°18'40", longitude 98°50'15", 3.1 river miles (5 km) from the confluence with the Rio Grande, and 9.3 river miles (15 km) downstream from Marte R. Gomez Dam. This stream enters the Rio Grande at river mile 238.7 (384.1 km); 3.7 river miles (6.0 km) upstream from the Rio Grande gaging station at Rio Grande City, 36.1 river miles (58.1 km) downstream from Falcon Dam. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 65 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Discharge prorated between measurements during times of extremely low flow. Records available: January 1954 through 1981.

**REMARKS:** Except for storm inflow, diversions, and drainage returns below Marte R. Gomez Dam, the flow at this station is controlled by spills from Marte R. Gomez Reservoir and leakage through the dam. Backwater from the Rio Grande frequently reaches this station. Prior to July 1, 1968 the zero of the gage was 130.45 feet (39.76 m) above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 115,000 second-feet (3,270 m<sup>3</sup>/sec) on September 25, 1967 with a gage height of 42.03 feet (12.81 m). Min. 0.4 second-foot (0.01 m<sup>3</sup>/sec) several days in May and June 1979.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                      |                |                  |                                 |
|----------|----------------------|----------------|------------------|---------------------------------|
| Daily:   | Max. 115,000 (3,250) | Sept. 25, 1967 | Min. 0.4 (0.01)  | Various days in May & June 1979 |
| Monthly: | Max. 31,600 (894)    | Sept. 1967     | Min. 1.1 (0.03)  | May 1979                        |
| Yearly:  | Max. 3,990 (113)     | 1967           | Min. 10.9 (0.31) | 1980                            |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.   | Feb.   | March | April | May   | June  | July   | Aug.    | Sept. | Oct.      | Nov.   | Dec.    |
|------------|--------|--------|-------|-------|-------|-------|--------|---------|-------|-----------|--------|---------|
| 1          | 5.3    | 9.9    | 3.9   | * 3.2 | 2.8   | 3.5   | * 4.9  | 330     | 1,170 | 706       | 519    | 73.5    |
| 2          | 4.9    | 9.9    | 3.9   | 3.2   | 3.2   | 245   | 7.1    | 268     | 1,370 | 1,090 *   | 516    | 72.7    |
| 3          | 4.9    | 10.2   | 3.9   | 2.8   | 3.5   | 399   | 9.5    | 206     | 1,640 | 1,220     | 512 *  | 72.7    |
| 4          | 4.9    | * 10.2 | * 3.9 | 2.8   | 3.9   | 35.3  | 11.7   | 144     | 1,990 | 1,200     | 509    | 72.4    |
| 5          | 4.9    | 9.2    | 3.9   | 2.8   | 3.9   | 17.7  | 14.1   | * 81.9  | 2,120 | 1,170 *   | 480    | 72.4    |
| 6          | 4.6    | 8.5    | 3.9   | 2.8   | * 4.2 | 15.5  | 16.2   | 71.0    | 2,120 | 1,090     | 452 *  | 72.0    |
| 7          | * 4.6  | 7.4    | 3.9   | 2.5   | 4.2   | 13.8  | 18.7   | 60.4    | 2,080 | * 989 *   | 452    | 72.0    |
| 8          | 7.4    | 6.7    | 3.9   | * 2.5 | 3.9   | 11.7  | * 20.8 | 49.4    | 1,980 | 1,020     | 466    | 71.7    |
| 9          | 10.6   | 5.7    | 3.9   | 2.5   | 3.9   | 9.9   | 18.7   | 38.5    | 1,890 | * 1,020 * | 646    | * 71.7  |
| 10         | 13.4   | 4.9    | 3.9   | 2.5   | 3.5   | * 7.8 | 16.2   | 27.5    | 1,770 | 953       | 378    | 70.6    |
| 11         | 16.2   | * 3.9  | 3.9   | 2.5   | 3.5   | 7.4   | 14.1   | 17.0    | 1,650 | * 883     | 307 *  | 69.6    |
| 12         | 19.1   | 4.2    | 3.9   | 2.5   | 3.2   | 7.4   | 11.7   | * 6.0   | 1,560 | 812       | 261    | 68.5    |
| 13         | 22.2   | 4.2    | 3.9   | 2.5   | * 3.2 | 7.1   | 9.5    | 6.0     | 1,530 | 777       | 222 *  | 67.1    |
| 14         | * 25.1 | 4.6    | 3.9   | 2.5   | 3.2   | 6.7   | 7.1    | 6.4     | 1,490 | 706       | 230    | 66.0    |
| 15         | 23.0   | 4.6    | 3.9   | 2.5   | 3.2   | 6.7   | * 4.9  | 6.4     | 1,370 | 671       | 247    | 65.0    |
| 16         | 20.8   | 4.9    | 3.9   | 2.5   | 3.2   | 6.4   | 4.9    | 6.7     | 1,240 | 636       | 261 *  | * 63.9  |
| 17         | 18.7   | 4.9    | 3.9   | 2.5   | 3.5   | 6.4   | 4.9    | 6.7     | 1,230 | 636       | 247    | 63.2    |
| 18         | 16.2   | * 5.3  | * 3.9 | 2.5   | 3.5   | 6.0   | 4.9    | 7.1     | 1,100 | 600       | 233 *  | 62.9    |
| 19         | 14.1   | 4.9    | 4.2   | 2.5   | 3.5   | 5.7   | 4.9    | * 7.1   | 218   | 565 *     | 205    | 62.2    |
| 20         | 12.0   | 4.9    | 4.2   | 2.5   | * 3.5 | 5.7   | 84.4   | 7.1     | 35.3  | 459       | 177    | 61.4    |
| 21         | * 9.6  | 4.6    | 4.6   | 2.5   | 3.5   | 5.3   | 710    | 6.7     | 26.5  | 388 *     | 148    | 60.7    |
| 22         | 9.9    | 4.6    | 4.9   | 2.5   | 3.5   | 4.9   | 727 *  | 6.7     | 17.7  | 388       | 120    | 60.4    |
| 23         | 9.5    | 4.2    | 5.3   | 2.5   | 3.5   | 4.9   | 600    | 6.7     | * 8.8 | 371 *     | * 91.8 | * 59.7  |
| 24         | 9.5    | 4.2    | 5.3   | 2.5   | 3.5   | * 4.6 | 477 *  | 6.7     | 8.8   | 371       | 84.8   | 59.3    |
| 25         | 9.5    | * 3.9  | * 5.7 | 2.5   | 3.5   | 4.6   | 300    | 6.4     | 8.8   | 424       | * 77.7 | 58.6    |
| 26         | 9.5    | 3.9    | 5.3   | 2.5   | 3.5   | 4.6   | 322    | * 6.4   | 8.8   | 494 *     | 77.0   | 58.3    |
| 27         | 9.2    | 3.9    | 4.9   | 2.5   | * 3.5 | 4.6   | 540    | 6.4     | 8.8   | 494       | 76.3   | 57.9    |
| 28         | * 9.2  | 3.9    | 4.6   | 2.5   | 3.5   | 4.9   | 526 *  | 307     | 8.8   | 459 *     | 75.6   | 57.6    |
| 29         | 9.2    |        | 4.2   | * 2.5 | 3.5   | 4.9   | 438    | 473     | 8.8   | 494       | 74.9   | 56.9    |
| 30         | 9.5    |        | 3.9   | 2.8   | 3.5   | 4.9   | 463    | 1,230   | 66.4  | 494 *     | * 56.5 | 54.0    |
| 31         | 9.5    |        | 3.5   |       | 3.5   | 3.5   | 392 *  | 1,000   | 494   |           |        |         |
| <b>Sum</b> |        | 162.2  |       | 77.9  |       | 872.9 |        | 4,409.2 |       | 22,074    |        | 2,011.4 |
|            |        | 357.3  |       | 130.8 |       | 109.0 |        | 5,784.2 |       | 29,725.5  |        | 8,220.3 |

### Current Year 1981

| Month  | Extreme Gage Feet |     | Extreme Second-Feet            |       | Average Second-Feet              | Total Acre-Feet | Acre-Feet |           |         |
|--------|-------------------|-----|--------------------------------|-------|----------------------------------|-----------------|-----------|-----------|---------|
|        | High              | Low | Day                            | Day   |                                  |                 | Average   | Maximum   | Minimum |
| Jan.   |                   |     | 14                             | 25.1  | 1 6                              | 4.6             | 11.7      | 709       | 11,535  |
| Feb.   |                   |     | 1 3                            | 10.2  | 111                              | 3.9             | 5.7       | 322       | 5,578   |
| Mar.   |                   |     | 25                             | 5.7   | 31                               | 3.5             | 4.2       | 259       | 3,242   |
| Apr.   |                   |     | 1 1                            | 3.2   | 7                                | 2.5             | 2.5       | 153       | 2,846   |
| May    |                   |     | 1 6                            | 4.2   | 1                                | 2.8             | 3.5       | 217       | 3,941   |
| June   |                   |     | 1 2                            | 1,170 | 1                                | 3.5             | 29.0      | 1,732     | 18,686  |
| July   |                   |     | 21                             | 777   | 1 1                              | 4.9             | 186       | 11,475    | 33,075  |
| Aug.   |                   |     | 30                             | 1,700 | 112                              | 6.0             | 142       | 8,742     | 24,417  |
| Sept.  |                   |     | 1 5                            | 2,120 | 123                              | 8.8             | 992       | 58,954    | 130,812 |
| Oct.   |                   |     | 3                              | 1,220 | 123                              | 371             | 713       | 43,813    | 119,091 |
| Nov.   |                   |     | 9                              | 646   | 30                               | 74.2            | 274       | 16,304    | 31,694  |
| Dec.   |                   |     | 1                              | 73.5  | 31                               | 54.0            | 65.0      | 3,990     | 19,887  |
|        |                   |     |                                | 2,120 |                                  | 2.5             | 203       | 146,670   | 404,804 |
| Yearly | <b>Meters</b>     |     | <b>Cubic Meters per Second</b> |       | <b>Thousands of Cubic Meters</b> |                 |           |           |         |
|        |                   |     |                                | 60.0  |                                  | 0.07            | 5.74      | 180,917   | 499,320 |
|        |                   |     |                                |       |                                  |                 |           | 3,566,125 | 9,941   |

\* Discharge measurement made on this day

! And other days

**DIVERSIONS FROM THE RIO GRANDE  
UNITED STATES SIDE, FALCON DAM TO RIO GRANDE CITY**

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its **Special Water Master**.

During 1981, 5,259 irrigable acres (2,128 ha) and several towns and rural homes were allotted Rio Grande water in the river reach between Falcon Dam and the Rio Grande City gaging station. Such irrigable area was 0.7% of the total irrigable acres (ha) below Falcon Dam allotted Rio Grande water.

The total diversion during 1981 in this river reach was 7,109 acre-feet (8,767,000 m<sup>3</sup>), or 0.9% of the total water diverted from the Rio Grande below Falcon Dam. All records of diversions in this river reach, which were determined by means of flow meters, were furnished by the Rio Grande Watermaster. More than one crop per year is often grown on parts of this land.

Records prior to 1976 were published under the title "Diversions from the Rio Grande, United States Side-Falcon Dam to Fort Ringgold."

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Second-Feet (Cubic Meters per Second) |                  |             |                 |              |  |  |  |
|---|------------------|-------------|-----------------|--------------|--|--|--|
| Daily:  | Max. 77.0 (2.18) | May 1, 1962 | Min. 0          | Occasionally |  |  |  |
| Monthly:  | Max. 43.8 (1.24) | June 1960   | Min. 2.2 (0.06) | March 1957   |  |  |  |
| Yearly:   | Max. 20.3 (0.57) | 1960        | Min. 6.9 (0.20) | 1968         |  |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb.         | March | April        | May  | June         | July | Aug.         | Sept. | Oct.         | Nov. | Dec.         |
|------------|------|--------------|-------|--------------|------|--------------|------|--------------|-------|--------------|------|--------------|
| 1          | 2.1  | 3.7          | 3.4   | 20.7         | 2.0  | 6.5          | 2.9  | 18.5         | 2.5   | 9.8          | 2.6  | 17.2         |
| 2          | 2.1  | 4.0          | 12.0  | 24.2         | 3.5  | 6.5          | 2.9  | 19.2         | 3.7   | 10.6         | 3.7  | 17.2         |
| 3          | 9.9  | 10.1         | 13.7  | 20.6         | 2.4  | 7.1          | 6.9  | 10.6         | 19.0  | 17.4         | 10.3 | 14.6         |
| 4          | 12.6 | 10.1         | 13.7  | 21.0         | 5.1  | 7.1          | 4.8  | 14.6         | 19.0  | 17.4         | 12.5 | 14.6         |
| 5          | 13.6 | 10.1         | 13.7  | 18.5         | 3.4  | 16.4         | 2.9  | 17.1         | 19.0  | 16.5         | 14.5 | 14.8         |
| 6          | 18.7 | 11.9         | 20.2  | 29.1         | 2.7  | 15.4         | 7.4  | 17.9         | 6.2   | 15.5         | 21.8 | 7.1          |
| 7          | 17.9 | 11.6         | 15.5  | 25.8         | 2.7  | 10.8         | 7.4  | 16.8         | 6.2   | 15.5         | 15.8 | 14.3         |
| 8          | 11.5 | 4.9          | 13.8  | 27.7         | 3.7  | 15.3         | 7.4  | 2.9          | 6.2   | 18.6         | 12.2 | 10.1         |
| 9          | 10.5 | 18.4         | 11.7  | 24.0         | 6.7  | 15.3         | 8.8  | 2.0          | 11.2  | 18.6         | 16.9 | 6.5          |
| 10         | 5.7  | 21.0         | 8.9   | 22.9         | 5.7  | 12.4         | 8.8  | 8.6          | 8.9   | 22.4         | 18.1 | 5.0          |
| 11         | 5.7  | 20.6         | 6.2   | 26.7         | 4.8  | 10.8         | 5.4  | 6.6          | 9.9   | 10.7         | 15.0 | 8.5          |
| 12         | 7.6  | 9.1          | 7.4   | 13.3         | 6.3  | 13.8         | 2.4  | 5.6          | 11.7  | 16.4         | 15.7 | 8.1          |
| 13         | 7.5  | 7.7          | 7.5   | 24.1         | 6.3  | 6.2          | 6.2  | 13.2         | 7.8   | 17.7         | 14.2 | 3.1          |
| 14         | 7.5  | 8.2          | 2.6   | 22.7         | 6.3  | 6.2          | 6.2  | 5.5          | 15.6  | 16.4         | 14.2 | 13.3         |
| 15         | 4.3  | 2.8          | 2.5   | 22.7         | 12.4 | 3.7          | 7.2  | 3.5          | 8.2   | 15.6         | 6.5  | 13.3         |
| 16         | 4.1  | 8.7          | 2.5   | 18.2         | 12.2 | 3.7          | 15.6 | 2.5          | 6.2   | 20.3         | 15.0 | 9.9          |
| 17         | 5.9  | 11.4         | 2.5   | 18.2         | 7.8  | 3.7          | 12.7 | 12.7         | 8.7   | 20.0         | 15.0 | 10.1         |
| 18         | 5.1  | 11.4         | 2.5   | 16.2         | 7.8  | 3.7          | 15.6 | 12.7         | 10.4  | 14.7         | 14.7 | 14.6         |
| 19         | 5.1  | 10.3         | 2.6   | 2.2          | 9.4  | 3.7          | 12.4 | 13.8         | 13.5  | 10.0         | 15.1 | 12.7         |
| 20         | 5.2  | 14.6         | 2.6   | 4.2          | 10.6 | 5.1          | 29.4 | 11.9         | 4.3   | 10.7         | 15.1 | 6.1          |
| 21         | 5.2  | 10.6         | 2.8   | 6.5          | 14.0 | 2.9          | 21.0 | 2.5          | 6.3   | 8.9          | 18.1 | 5.1          |
| 22         | 5.2  | 6.2          | 2.8   | 3.1          | 18.0 | 2.9          | 20.1 | 3.6          | 7.7   | 9.9          | 10.2 | 5.1          |
| 23         | 3.5  | 6.2          | 8.6   | 3.1          | 12.7 | 2.9          | 17.9 | 3.6          | 5.5   | 7.7          | 18.6 | 3.3          |
| 24         | 6.7  | 8.0          | 7.2   | 3.1          | 9.3  | 2.9          | 19.5 | 2.0          | 6.2   | 10.3         | 18.5 | 3.3          |
| 25         | 4.8  | 8.0          | 11.0  | 3.1          | 9.3  | 2.9          | 14.4 | 2.0          | 6.2   | 3.7          | 19.3 | 5.0          |
| 26         | 4.7  | 8.0          | 11.0  | 2.4          | 5.5  | 2.9          | 8.9  | 2.5          | 8.1   | 3.7          | 16.6 | 5.4          |
| 27         | 4.7  | 8.0          | 9.5   | 2.4          | 5.5  | 2.9          | 15.2 | 2.5          | 9.0   | 2.6          | 14.7 | 4.5          |
| 28         | 4.7  | 5.0          | 14.4  | 2.4          | 5.5  | 2.9          | 18.5 | 2.5          | 10.4  | 2.6          | 12.3 | 9.0          |
| 29         | 4.7  |              | 9.0   | 1.7          | 7.1  | 2.9          | 19.1 | 2.5          | 10.4  | 2.6          | 8.7  | 12.3         |
| 30         | 3.7  |              | 16.3  | 1.7          | 4.9  | 2.9          | 20.0 | 2.5          | 10.4  | 2.6          | 10.5 | 8.8          |
| 31         | 4.3  |              | 18.7  |              | 2.5  |              | 20.0 | 2.5          | 2.6   |              |      | 8.0          |
| <b>Sum</b> |      | <b>270.6</b> |       | <b>432.5</b> |      | <b>202.4</b> |      | <b>244.9</b> |       | <b>372.0</b> |      | <b>290.9</b> |
|            |      | <b>214.8</b> |       | <b>276.8</b> |      | <b>216.1</b> |      | <b>367.9</b> |       | <b>278.4</b> |      | <b>416.4</b> |

**Current Year 1981**

| Month  | Average Rainfall<br>Inches** |       | Extreme Second-Feet     |      | Average<br>Second-<br>Foot | Total<br>Acre-Feet        | Acre-Feet |         |                    |
|--------|------------------------------|-------|-------------------------|------|----------------------------|---------------------------|-----------|---------|--------------------|
|        | 1957-1981                    | 1981  | Day                     | High | Low                        |                           | Average   | Maximum | Minimum            |
| Jan.   | 1.05                         | 3.15  | 6                       | 18.7 | 1 1                        | 2.1                       | 6.9       | 426     | 678 1,482 159      |
| Feb.   | 1.03                         | 1.03  | 10                      | 21.0 | 15                         | 2.8                       | 9.7       | 537     | 812 1,782 223      |
| Mar.   | .58                          | 2.19  | 6                       | 20.2 | 115                        | 2.5                       | 8.9       | 549     | 1,062 1,845 158    |
| Apr.   | 1.41                         | 3.27  | 6                       | 29.1 | 129                        | 1.7                       | 14.4      | 858     | 1,115 2,199 357    |
| May    | 2.39                         | 5.36  | 22                      | 18.0 | 1                          | 2.0                       | 7.0       | 429     | 1,011 2,624 211    |
| June   | 2.62                         | 5.97  | 5                       | 16.4 | 121                        | 2.9                       | 6.7       | 401     | 997 2,610 209      |
| July   | 1.44                         | 1.50  | 20                      | 29.4 | 12                         | 2.4                       | 11.9      | 730     | 682 1,620 278      |
| Aug.   | 2.39                         | 5.36  | 2                       | 19.2 | 1 9                        | 2.0                       | 7.9       | 486     | 536 1,252 178      |
| Sept.  | 4.90                         | 1.34  | 1 3                     | 19.0 | 1                          | 2.5                       | 9.3       | 552     | 726 1,549 131      |
| Oct.   | 2.18                         | 3.23  | 10                      | 22.4 | 127                        | 2.6                       | 12.0      | 738     | 536 1,170 211      |
| Nov.   | 1.11                         | 0     | 6                       | 21.8 | 1                          | 2.6                       | 13.9      | 826     | 573 1,580 145      |
| Dec.   | .77                          | .28   | 1 1                     | 17.2 | 13                         | 3.1                       | 9.4       | 577     |                    |
|        | 21.87                        | 32.68 |                         | 29.4 |                            | 1.7                       | 9.8       | 7,109   | 9,458 14,754 4,989 |
| Yearly | Millimeters                  |       | Cubic Meters per Second |      |                            | Thousands of Cubic Meters |           |         |                    |
|        | 555                          | 830   | 0.83                    | 0.05 | 0.28                       | 8,767                     | 11,666    | 18,199  | 6,154              |

\*\* United States side - average of several stations in the reach

0 Mean daily

1 And other days

**RIO GRANDE AT RIO GRANDE CITY, TEXAS NEAR CAMARGO, TAMAULIPAS**

**DESCRIPTION:** Cableway, bubbler gage, gravity well, water-stage recorders (graphic and digital), and digital transmitter located on the left bank at Fort Ringgold, latitude 26°22'00", longitude 98°48'10", and river mile 235.0 (378.1 km); about 1 mile (1.6 km) downstream from Rio Grande City, Texas, and 3.7 river miles (6.0 km) downstream from Rio San Juan. The zero of the gage is 100.00 feet (30.48 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 18 discharge measurements during the year, and a continuous record of gage heights. Computations by shifting control methods. Records available: January 1955 through 1981. Records prior to 1976 were published under the title "Rio Grande at Fort Ringgold, Rio Grande City, Texas." Records composed of the addition of discharges of the Rio Grande at Roma, Texas and the Rio San Juan at Santa Rosalia, Tamaulipas are available for May, June, and October 1914; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June 1922; September 1923; and 1924 through 1931. Records are also available for the station "Rio Grande near Rio Grande City," 3.0 miles (4.8 km) downstream, for 1932 through 1954.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Except for tributary inflows and intervening diversions below Falcon Dam, flow at this station is controlled largely by releases from Falcon Reservoir, 39.9 river miles (64.1 km) upstream. The transmitter relays gage height data via radio to the Mercedes Office of the Commission, where it is recorded automatically, and to the Anzalduas Dam control room for visual readout.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 220,000 second-feet (6,230 m<sup>3</sup>/sec) on September 22 and 23, 1967 with a gage height of 61.40 feet (18.71 m). Min. no flow occurred several days in June and July 1953.

| Average Flow in Second-Feet (Cubic Meters per Second)** |                      |                |                   |                |      |
|---|----------------------|----------------|-------------------|----------------|------|
| Daily:  | Max. 207,000 (5,860) | Sept. 23, 1967 | Min. 14.6 (0.41)  | April 13, 1957 |      |
| Monthly:  | Max. 49,600 (1,400)  | Oct. 1958      | Min. 235 (6.66)   | March 1957     |      |
| Yearly:   | Max. 9,140 (259)     | 1958           | Min. 1,750 (49.6) |                | 1970 |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb.    | March   | April   | May      | June     | July   | Aug.    | Sept.   | Oct.   | Nov.    | Dec.    |
|------------|---------|---------|---------|---------|----------|----------|--------|---------|---------|--------|---------|---------|
| 1          | 526     | 452     | 1,230   | 1,530   | 6,070 *  | 7,630    | 13,500 | 2,570   | 1,780 * | 5,540  | 3,320   | 2,270   |
| 2          | 626     | 306     | 1,390   | 1,960   | 5,790    | 7,840    | 13,500 | 2,980   | 1,760   | 5,720  | 2,670 * | 2,270   |
| 3          | 480     | 629 *   | 1,290   | 2,260   | 7,700    | 8,190    | 13,500 | 2,930   | 1,780   | 5,120  | 2,600   | 2,260 * |
| 4          | 1,020   | 678     | 1,130   | 2,400   | 11,100   | 8,120    | 12,100 | 3,050   | 1,870   | 4,380  | 2,350   | 2,240   |
| 5          | 1,160   | 562     | 1,110   | 2,050   | 8,230    | 7,880    | 8,440  | 3,150   | 2,200   | 4,030  | 1,780   | 2,260   |
| 6          | 1,240   | 480     | 946 *   | 2,260   | 7,100    | 7,310    | 6,040  | 3,640   | 3,880   | 3,470  | 1,480   | 2,270   |
| 7          | 1,720   | 526     | 1,100   | 2,330   | 7,310    | 7,240    | 7,270  | 3,780   | 4,630   | 2,740  | 1,470   | 2,270   |
| 8          | 2,190 * | 565     | 1,410   | 2,850   | 12,300   | 5,260    | 7,270  | 4,270   | 5,160   | 2,580  | 1,420   | 2,270   |
| 9          | 2,800   | 537     | 1,440   | 3,150 * | 13,700   | 3,670    | 7,700  | 4,560   | 5,970   | 3,020  | 1,740   | 2,270   |
| 10         | 2,290   | 562     | 1,570   | 3,390   | 13,600   | 3,320    | 12,500 | 4,480 * | 6,320   | 4,270  | 2,450   | 2,270   |
| 11         | 2,140   | 657     | 1,290   | 3,570   | 13,500   | 3,010 *  | 13,500 | 4,100   | 7,130   | 5,160  | 2,420   | 2,290   |
| 12         | 1,940   | 618     | 579     | 3,780   | 13,600   | 2,850    | 13,500 | 4,030   | 6,110   | 4,800  | 2,430   | 2,280   |
| 13         | 996     | 547     | 406     | 3,530   | 13,500   | 3,110    | 12,300 | 4,310   | 6,320   | 6,320  | 2,430   | 2,270   |
| 14         | 501     | 572     | 247     | 3,880   | 13,500   | 4,560    | 8,330  | 4,170   | 4,590   | 7,350  | 2,420   | 2,290   |
| 15         | 272     | 572     | 189     | 3,780   | 13,600   | 5,370    | 3,130  | 3,850   | 3,880   | 7,560  | 2,470   | 2,300   |
| 16         | 618     | 547     | 182     | 4,660   | 14,500   | 9,710    | 805    | 3,960   | 4,130   | 6,360  | 2,320   | 2,270   |
| 17         | 699     | 1,900   | 209     | 4,310   | 13,900   | 14,100   | 1,820  | 4,030   | 4,800   | 5,050  | 2,360   | 2,270   |
| 18         | 957     | 2,090 * | 392     | 3,640   | 13,600   | 9,110    | 2,480  | 3,990   | 5,900   | 4,560  | 2,360 * | 2,350   |
| 19         | 929     | 2,190   | 590 *   | 4,480   | 13,500   | 12,900   | 2,100  | 4,060   | 5,230   | 3,710  | 2,350   | 2,320   |
| 20         | 759     | 2,350   | 862     | 3,920   | 13,500   | 13,700   | 2,170  | 4,030   | 5,010   | 3,110  | 2,370   | 2,290   |
| 21         | 600     | 2,300   | 929     | 3,990   | 13,400 * | 13,700   | 2,970  | 3,920   | 4,980   | 3,080  | 2,300   | 2,270   |
| 22         | 579     | 2,240   | 766     | 5,510   | 13,300   | 13,600   | 2,780  | 3,740   | 5,970   | 3,360  | 2,370   | 2,250   |
| 23         | 540 *   | 1,130   | 742     | 6,110   | 13,300   | 13,600   | 2,810  | 3,710   | 6,360   | 6,320  | 2,260   | 2,340   |
| 24         | 547     | 1,120   | 840     | 6,920   | 12,300   | 13,600   | 2,750  | 3,490   | 6,460   | 6,460  | 2,320   | 2,290   |
| 25         | 572     | 1,110   | 1,260   | 4,980   | 11,500   | 13,600   | 2,670  | 3,850 * | 6,430   | 6,320  | 2,320   | 2,320   |
| 26         | 547     | 1,120   | 1,180   | 3,400   | 10,200   | 13,700 * | 2,670  | 2,720   | 6,430   | 6,460  | 2,290   | 2,310   |
| 27         | 547     | 1,130   | 1,360   | 4,270   | 9,040    | 14,600   | 2,670  | 2,250   | 6,430   | 7,100  | 2,290   | 2,310   |
| 28         | 572     | 1,130   | 1,820   | 3,030   | 8,050    | 13,400   | 3,290  | 2,520   | 4,980   | 7,240  | 2,290   | 2,300   |
| 29         | 547     | 1,920   | 3,430   | 7,310   | 12,200   | 2,900    | 2,470  | 4,980   | 6,390   | 2,310  | 2,320   |         |
| 30         | 547     | 1,990   | 4,560   | 11,100  | 13,400   | 2,710    | 3,090  | 5,230   | 5,580   | 2,300  | 2,320   |         |
| 31         | 547     | 1,500   | 8,440   | 1,310   | 2,290    | 1,850    |        |         |         | 3,780  |         |         |
| <b>Sum</b> |         | 28,620  | 109,930 | 280,280 |          | 109,550  |        | 156,940 |         | 70,930 |         |         |
|            |         | 29,908  | 31,869  | 347,540 |          | 192,845  |        | 146,700 |         | 68,260 |         |         |

**Current Year 1981****Period 1955-1981**

| Month  | Extreme Gage Feet |       |       | Extreme Second-Feet            |      | Average Second-Feet | Total Acre-Feet                  | Acre-Feet |           |           |           |
|--------|-------------------|-------|-------|--------------------------------|------|---------------------|----------------------------------|-----------|-----------|-----------|-----------|
|        | High              | Low   | Day   | High                           | Low  |                     |                                  | Average   | Maximum   | Minimum   |           |
| Jan.   | 28.61             | 24.80 | 9     | 4,670                          | 16   | 209                 | 964                              | 59,328    | 217,325   | 416,906   |           |
| Feb.   | 27.99             | 24.90 | 20    | 3,590                          | 2    | 255                 | 1,020                            | 56,755    | 175,155   | 376,607   |           |
| Mar.   | 27.69             | 24.73 | 29    | 1,310                          | 15   | 180                 | 1,030                            | 63,237    | 144,609   | 378,000   |           |
| Apr.   | 30.11             | 25.69 | 30    | 7,800                          | 1    | 770                 | 3,670                            | 218,058   | 259,915   | 510,426   |           |
| May    | 33.92             | 28.90 | 16    | 14,800                         | 1    | 4,870               | 11,200                           | 689,106   | 352,106   | 689,106   |           |
| June   | 34.45             | 25.52 | 16    | 15,700                         | 11   | 738                 | 9,320                            | 555,810   | 305,309   | 658,255   |           |
| July   | 33.20             | 25.33 | 11    | 13,600                         | 116  | 519                 | 6,220                            | 382,567   | 187,502   | 573,798   |           |
| Aug.   | 29.69             | 26.12 | 10    | 6,220                          | 28   | 1,250               | 3,530                            | 217,246   | 250,276   | 1,502,678 |           |
| Sept.  | 30.25             | 26.61 | 11    | 7,240                          | 1    | 1,740               | 4,870                            | 290,975   | 364,078   | 2,712,754 |           |
| Oct.   | 30.41             | 26.67 | 114   | 7,560                          | 120  | 1,820               | 5,050                            | 311,267   | 385,048   | 3,047,000 |           |
| Nov.   | 28.58             | 25.98 | 1     | 4,340                          | 8    | 1,120               | 2,270                            | 135,342   | 159,997   | 1,442,000 |           |
| Dec.   | 27.99             | 26.18 | 23    | 3,470                          | 3    | 1,310               | 2,290                            | 140,756   | 136,745   | 540,000   |           |
|        |                   | 34.45 | 24.73 | 15,700                         |      | 180                 | 4,310                            | 3,120,447 | 2,938,065 | 6,619,700 | 1,269,259 |
| Yearly | <b>Meters</b>     |       |       | <b>Cubic Meters per Second</b> |      |                     | <b>Thousands of Cubic Meters</b> |           |           |           |           |
|        | 10.50             | 7.54  |       | 445                            | 5.11 | 122                 | 3,849,029                        | 3,624,100 | 8,165,400 | 1,565,631 |           |

\*\* Period 1955-1981 \* Discharge measurement made on this day

! And other days

# 1954 values are Rio Grande City less arroyo inflow

**CONTRIBUTIONS TO THE RIO GRANDE FROM  
THE LOWER RIO SAN JUAN IRRIGATION DISTRICT  
RIO GRANDE CITY TO ANZALDUAS DAM**

**DESCRIPTION:** The Lower Rio San Juan Irrigation District in Mexico lies along the Rio Grande between Cd. Miguel Aleman and Rio Bravo, Tamaulipas and is irrigated with water impounded by Marte R. Gomez Dam situated on the Rio San Juan 12.4 river miles (20 km) upstream from the confluence with the Rio Grande. The Rio San Juan enters the Rio Grande at river mile 238.7 (384.1 km). Drain water from this irrigation district enters the Rio Grande between Falcon Dam and the Rio Grande City Gaging Station through the Rio San Juan channel, Rancherias Drain, and Los Fresnos Drain; and between this station and Anzalduas Dam through Puertecitos, Los Indios, Huizache, and Morillo Drains. Only the portion of drain water from this irrigation district reaching the Rio Grande via drains located downstream from Rio Grande City Gaging Station is shown below. The portion of water reaching the Rio Grande via channels located upstream from the Rio Grande City Gaging Station is shown on page 63 in this bulletin.

**RECORDS:** Drain water reaching the Rio Grande through Morillo Drain was determined by hourly staff gage readings and the weir discharge table, and through Puertecitos and Los Indios Drains by prorating between frequent current meter measurements. In 1981, 49, 49, and 6 meter measurements were made at Puertecitos, Los Indios, and Morillo Drains, respectively. All storm water measured at these drains was deducted and is not included in the tabulation below. In 1981, 51% of the drain water from this irrigation district reaching the Rio Grande between the Rio Grande City Gaging Station and Anzalduas Dam was contributed by Morillo Drain. Records available: 1953 through 1981.

**REMARKS:** In 1981 there were 100,767 irrigable acres (40,779 ha) in the Lower Rio San Juan Irrigation District. Since July 9, 1969 some water has been diverted from Morillo Drain directly to the gulf via the Morillo Drain Diversion Canal to reduce the salinity of Rio Grande waters. In 1981, 39,258 acre-feet (48,424,000 m<sup>3</sup>) were diverted.

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.         | Feb. | March        | April | May            | June | July           | Aug. | Sept.          | Oct. | Nov.         | Dec. |
|------------|--------------|------|--------------|-------|----------------|------|----------------|------|----------------|------|--------------|------|
| 1          | 9.2          | 14.8 | 9.9          | 7.1   | 8.8            | 184  | 123            | 23.3 | 33.5           | 157  | 30.4         | 20.1 |
| 2          | 8.8          | 13.4 | 9.9          | 7.1   | 9.2            | 189  | 118            | 23.3 | 41.0           | 184  | 29.3         | 19.4 |
| 3          | 8.8          | 12.0 | 9.5          | 6.7   | 9.5            | 194  | 82.6           | 23.3 | 32.8           | 156  | 28.3         | 19.1 |
| 4          | 8.8          | 10.6 | 9.5          | 6.7   | 9.9            | 198  | 69.2           | 23.7 | 32.5           | 131  | 27.2         | 18.7 |
| 5          | 8.8          | 10.2 | 9.5          | 6.7   | 10.2           | 203  | 81.9           | 23.7 | 32.5           | 86.5 | 26.5         | 18.4 |
| 6          | 8.5          | 10.2 | 9.5          | 6.7   | 105            | 194  | 27.2           | 24.4 | 32.1           | 34.3 | 26.1         | 18.4 |
| 7          | 8.5          | 9.9  | 9.5          | 6.4   | 99.9           | 190  | 23.7           | 24.7 | 32.1           | 26.8 | 26.5         | 18.0 |
| 8          | 8.8          | 9.5  | 9.5          | 6.4   | 95.3           | 91.8 | 66.7           | 25.4 | 35.7           | 28.6 | 25.1         | 17.7 |
| 9          | 8.8          | 9.2  | 9.5          | 6.4   | 90.8           | 32.5 | 26.5           | 26.1 | 49.8           | 27.5 | 24.4         | 17.3 |
| 10         | 9.2          | 9.2  | 9.5          | 6.4   | 85.8           | 39.9 | 29.0           | 26.8 | 31.8           | 27.9 | 24.0         | 17.3 |
| 11         | 8.8          | 8.8  | 9.2          | 6.4   | 80.9           | 33.9 | 24.4           | 27.2 | 31.1           | 28.6 | 23.3         | 17.0 |
| 12         | 9.2          | 9.2  | 9.2          | 6.7   | 76.3           | 33.2 | 22.6           | 27.9 | 30.0           | 29.0 | 23.0         | 17.0 |
| 13         | 9.2          | 9.2  | 9.2          | 6.7   | 80.5           | 33.2 | 22.6           | 27.9 | 29.3           | 29.3 | 22.2         | 16.6 |
| 14         | 9.5          | 9.5  | 9.2          | 6.7   | 85.5           | 33.5 | 22.2           | 44.8 | 28.3           | 29.7 | 21.9         | 16.6 |
| 15         | 9.5          | 9.9  | 9.2          | 6.7   | 90.8           | 33.9 | 22.2           | 56.5 | 27.2           | 30.0 | 20.8         | 16.2 |
| 16         | 9.9          | 10.2 | 9.2          | 7.4   | 95.7           | 33.9 | 21.5           | 32.1 | 26.5           | 29.7 | 20.5         | 16.2 |
| 17         | 9.9          | 10.2 | 9.2          | 7.8   | 101            | 33.9 | 20.8           | 30.0 | 25.8           | 38.8 | 19.8         | 16.6 |
| 18         | 10.6         | 10.6 | 9.2          | 8.5   | 106            | 153  | 20.1           | 33.5 | 25.8           | 78.8 | 19.4         | 16.6 |
| 19         | 10.6         | 10.6 | 9.2          | 8.8   | 112            | 153  | 19.4           | 35.0 | 25.8           | 75.9 | 20.1         | 17.0 |
| 20         | 10.9         | 10.6 | 9.2          | 9.5   | 120            | 153  | 18.7           | 42.7 | 25.4           | 73.1 | 21.2         | 17.0 |
| 21         | 10.9         | 10.6 | 9.2          | 9.9   | 129            | 154  | 18.0           | 68.2 | 25.4           | 39.9 | 22.2         | 17.3 |
| 22         | 12.4         | 10.2 | 9.2          | 10.6  | 138            | 155  | 17.3           | 65.3 | 25.4           | 38.1 | 26.8         | 17.3 |
| 23         | 13.4         | 10.2 | 9.2          | 37.4  | 148            | 156  | 18.0           | 54.7 | 25.4           | 37.1 | 26.1         | 17.7 |
| 24         | 14.8         | 10.2 | 9.2          | 52.3  | 157            | 157  | 18.7           | 55.1 | 25.8           | 36.4 | 26.1         | 17.3 |
| 25         | 16.2         | 10.2 | 9.2          | 54.7  | 166            | 157  | 19.4           | 50.1 | 26.5           | 35.0 | 26.1         | 16.6 |
| 26         | 17.7         | 10.2 | 8.8          | 56.9  | 176            | 151  | 20.8           | 44.8 | 26.8           | 33.9 | 31.1         | 16.2 |
| 27         | 18.7         | 9.9  | 8.5          | 59.0  | 178            | 145  | 21.5           | 36.0 | 27.2           | 34.3 | 25.8         | 15.5 |
| 28         | 20.1         | 9.9  | 8.1          | 41.0  | 178            | 139  | 22.2           | 31.1 | 27.5           | 35.3 | 22.6         | 15.2 |
| 29         | 18.7         |      | 8.1          | 8.1   | 178            | 134  | 23.0           | 31.8 | 28.3           | 34.3 | 21.9         | 14.5 |
| 30         | 17.3         |      | 7.8          | 8.5   | 179            | 128  | 23.0           | 32.5 | 70.6           | 33.2 | 21.2         | 14.1 |
| 31         | 15.9         |      | 7.4          |       | 179            |      | 23.3           | 33.2 |                | 32.1 |              | 14.1 |
| <b>Sum</b> | <b>289.2</b> |      | <b>480.2</b> |       | <b>3,686.7</b> |      | <b>1,105.1</b> |      | <b>1,692.1</b> |      | <b>527.0</b> |      |
|            | <b>362.4</b> |      | <b>282.5</b> |       | <b>3,279.1</b> |      | <b>1,087.5</b> |      | <b>937.9</b>   |      | <b>729.9</b> |      |

| Current Year 1981 |                   |      |            |                                |            |      |                                  |                 |               |                |               |                  |
|-------------------|-------------------|------|------------|--------------------------------|------------|------|----------------------------------|-----------------|---------------|----------------|---------------|------------------|
| Month             | Extreme Gage Feet |      |            | Extreme Second-Feet            |            |      | Average Second-Feet              | Total Acre-Feet | Acre-Feet     |                |               | Period 1954-1981 |
|                   | High              | Low  | Day        | High                           | Low        | Day  |                                  |                 | Average       | Maximum        | Minimum       |                  |
| Jan.              |                   |      | 28         | 20.1                           | ! 6        | 8.5  | 11.7                             | 719             | 2,001         | 4,745          | 466           |                  |
| Feb.              |                   |      | 1          | 14.8                           | 11         | 8.8  | 10.2                             | 574             | 3,064         | 7,059          | 509           |                  |
| Mar.              | ! 1               |      | 9.9        | 31                             | 7.4        | 9.2  | 560                              | 2,272           | 5,291         | 560            |               |                  |
| Apr.              |                   |      | 27         | 59.0                           | ! 7        | 6.4  | 15.9                             | 952             | 3,119         | 6,111          | 899           |                  |
| May               | 130               | 179  | 1          | 8.8                            | 106        |      | 6,505                            | 7,496           | 30,179        | 1,557          |               |                  |
| June              | 5                 | 203  | 9          | 32.5                           | 123        |      | 7,312                            | 9,356           | 85,952        | 2,027          |               |                  |
| July              | 1                 | 123  | 22         | 17.3                           | 35.0       |      | 2,157                            | 5,025           | 48,782        | 899            |               |                  |
| Aug.              | 21                | 68.2 | ! 1        | 23.3                           | 35.7       |      | 2,192                            | 2,606           | 13,292        | 661            |               |                  |
| Sept.             | 30                | 70.6 | 120        | 25.4                           | 31.1       |      | 1,861                            | 2,486           | 11,273        | 665            |               |                  |
| Oct.              | 2                 | 184  | 7          | 26.8                           | 54.4       |      | 3,356                            | 3,035           | 9,831         | 623            |               |                  |
| Nov.              | 26                | 31.1 | 18         | 19.4                           | 24.4       |      | 1,448                            | 2,217           | 10,461        | 520            |               |                  |
| Dec.              | 1                 | 20.1 | ! 30       | 14.1                           | 17.0       |      | 1,045                            | 2,773           | 34,043        | 512            |               |                  |
| <b>Yearly</b>     |                   |      | <b>203</b> |                                | <b>6.4</b> |      | <b>39.6</b>                      | <b>28,681</b>   | <b>45,450</b> | <b>179,482</b> | <b>13,462</b> |                  |
|                   | <b>Meters</b>     |      |            | <b>Cubic Meters per Second</b> |            |      | <b>Thousands of Cubic Meters</b> |                 |               |                |               |                  |
|                   |                   |      |            | 5.75                           | 0.18       | 1.12 | 35,377                           | 56,062          | 221,389       | 16,608         |               |                  |

Ø Mean daily

! And other days

**DIVERSIONS FROM THE RIO GRANDE**  
**UNITED STATES SIDE, RIO GRANDE CITY TO ANZALDUAS DAM**

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1981, 179,639 irrigable acres (72,698 ha) and several towns and rural homes were allotted Rio Grande water in the river reach between the gaging station at Rio Grande City and Anzalduas Dam. Such irrigable area was 24.6% of the total irrigable acres (ha) below Falcon Dam allotted Rio Grande water.

The total diversion during 1981 in this river reach was 227,393 acre-feet (280,488,000 m<sup>3</sup>), or 26.3% of the total water diverted from the Rio Grande below Falcon Dam. About 84% of the water diverted in this river reach was determined by the International Boundary and Water Commission through records of discharge obtained by means of flow meters, and by deflection meters developed by the Commission. The records for the rest of these diversions were furnished by the Rio Grande Watermaster and were determined from records of discharge obtained by means of flow meters. More than one crop per year is often grown on parts of this land.

| Average Flow in Second-Feet (Cubic Meters per Second) |                   |               |                  |
|---|-------------------|---------------|------------------|
| Daily:  | Max. 1,220 (34.6) | June 21, 1960 | Min. 0           |
| Monthly:  | Max. 1,010 (28.6) | June 1960     | Min. 10.3 (0.29) |
| Yearly:   | Max. 417 (11.8)   | 1961          | Min. 188 (5.32)  |

Occasionally  
March 1957  
1966

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day | Jan.    | Feb.     | March   | April    | May      | June     | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|---------|----------|---------|----------|----------|----------|------|------|-------|------|------|------|
| 1   | 88.9    | 42.2     | 168     | 671      | 174      | 448      | 201  | 481  | 118   | 754  | 59.0 | 556  |
| 2   | 88.9    | 76.6     | 307     | 654      | 81.6     | 452      | 171  | 409  | 192   | 603  | 108  | 653  |
| 3   | 113     | 97.8     | 444     | 463      | 15.2     | 409      | 175  | 766  | 253   | 400  | 163  | 545  |
| 4   | 130     | 125      | 357     | 351      | 25.7     | 367      | 134  | 790  | 218   | 409  | 283  | 495  |
| 5   | 189     | 71.3     | 500     | 317      | 41.4     | 253      | 116  | 802  | 143   | 595  | 246  | 362  |
| 6   | 267     | 87.6     | 446     | 747      | 60.6     | 98.7     | 121  | 815  | 89.1  | 647  | 259  | 271  |
| 7   | 287     | 153      | 374     | 695      | 22.6     | 63.0     | 121  | 761  | 152   | 729  | 257  | 532  |
| 8   | 306     | 69.2     | 269     | 734      | 62.2     | 331      | 83.8 | 525  | 280   | 511  | 222  | 509  |
| 9   | 311     | 205      | 556     | 779      | 20.0     | 440      | 123  | 467  | 329   | 459  | 310  | 510  |
| 10  | 94.3    | 169      | 477     | 786      | 0        | 510      | 184  | 793  | 350   | 222  | 297  | 507  |
| 11  | 31.6    | 185      | 164     | 530      | 83.4     | 493      | 118  | 770  | 314   | 213  | 408  | 383  |
| 12  | 170     | 156      | 130     | 192      | 146      | 484      | 72.8 | 762  | 184   | 529  | 335  | 219  |
| 13  | 94.9    | 161      | 54.8    | 888      | 93.3     | 317      | 169  | 703  | 174   | 621  | 430  | 201  |
| 14  | 47.6    | 117      | 36.1    | 814      | 149      | 246      | 101  | 678  | 472   | 664  | 301  | 472  |
| 15  | 72.6    | 77.2     | 4.5     | 793      | 201      | 399      | 194  | 427  | 530   | 626  | 210  | 504  |
| 16  | 44.3    | 54.0     | 37.9    | 691      | 157      | 332      | 187  | 355  | 540   | 571  | 413  | 496  |
| 17  | 35.4    | 56.6     | 37.8    | 553      | 90.4     | 136      | 278  | 755  | 506   | 360  | 414  | 523  |
| 18  | 31.8    | 118      | 84.6    | 366      | 252      | 168      | 165  | 759  | 444   | 266  | 476  | 408  |
| 19  | 59.0    | 112      | 139     | 244      | 294      | 128      | 134  | 810  | 205   | 228  | 392  | 208  |
| 20  | 59.0    | 145      | 228     | 650      | 349      | 123      | 265  | 664  | 224   | 340  | 440  | 147  |
| 21  | 36.8    | 58.8     | 156     | 641      | 387      | 84.3     | 330  | 495  | 572   | 367  | 261  | 480  |
| 22  | 50.6    | 47.4     | 187     | 764      | 426      | 167      | 436  | 332  | 639   | 216  | 223  | 464  |
| 23  | 49.4    | 148      | 264     | 573      | 262      | 242      | 467  | 318  | 651   | 123  | 488  | 492  |
| 24  | 37.6    | 204      | 332     | 236      | 238      | 261      | 425  | 491  | 644   | 49.7 | 529  | 187  |
| 25  | 4.1     | 255      | 429     | 84.8     | 248      | 222      | 311  | 433  | 564   | 10.8 | 519  | 25.2 |
| Sum | 3,531.7 | 15,028.8 | 7,860.5 | 16,227.3 | 11,146.0 | 12,604.2 |      |      |       |      |      |      |
|     | 2,991.2 | 8,756.7  | 6,072.4 | 8,736.6  | 12,026.1 | 9,663.0  |      |      |       |      |      |      |

| Month | Current Year 1981            |       |                       |      | Period 1957-1981           |                    |           |         |         |
|-------|------------------------------|-------|-----------------------|------|----------------------------|--------------------|-----------|---------|---------|
|       | Average Rainfall<br>Inches** |       | 0 Extreme Second-Feet |      | Average<br>Second-<br>Foot | Total<br>Acre-Feet | Acre-Feet |         |         |
|       | 1957-1981                    | 1981  | Day                   | Day  |                            |                    | Average   | Maximum | Minimum |
| Jan.  | 1.34                         | 2.75  | 9                     | 311  | 25                         | 4.1                | 96.5      | 5,933   | 11,881  |
| Feb.  | 1.05                         | 1.47  | 25                    | 255  | 1                          | 42.2               | 126       | 7,005   | 12,379  |
| Mar.  | .66                          | 2.77  | 31                    | 610  | 15                         | 4.5                | 282       | 17,369  | 20,835  |
| Apr.  | 1.52                         | 2.29  | 13                    | 888  | 126                        | 60.0               | 501       | 29,809  | 25,319  |
| May   | 2.36                         | 5.19  | 27                    | 542  | 10                         | 0                  | 196       | 12,044  | 23,445  |
| June  | 2.72                         | 6.08  | 10                    | 510  | 7                          | 63.0               | 262       | 15,591  | 24,472  |
| July  | 1.49                         | 2.79  | 31                    | 748  | 12                         | 72.8               | 282       | 17,329  | 22,288  |
| Aug.  | 2.41                         | 4.55  | 6                     | 815  | 30                         | 45.4               | 523       | 32,186  | 46,423  |
| Sept. | 3.92                         | .80   | 29                    | 828  | 6                          | 89.1               | 401       | 21,790  | 36,280  |
| Oct.  | 2.64                         | 3.62  | 1                     | 754  | 25                         | 10.8               | 360       | 23,853  | 14,312  |
| Nov.  | .96                          | .04   | 30                    | 531  | 1                          | 59.0               | 322       | 22,108  | 35,000  |
| Dec.  | .91                          | .16   | 2                     | 653  | 25                         | 25.2               | 407       | 19,166  | 16,107  |
|       | 21.98                        | 32.51 |                       | 888  | 0                          | 314                | 227,393   | 218,662 | 302,180 |
|       | Millimeters                  |       |                       |      | Thousands of Cubic Meters  |                    |           |         |         |
|       | 558                          | 826   |                       | 25.1 | 0                          | 8,89               | 280,488   | 269,720 | 372,739 |
|       |                              |       |                       |      |                            |                    |           |         | 168,323 |

\*\* United States side - average of several stations in the reach      0 Mean daily      ! And other days

**DIVERSIONS FROM THE RIO GRANDE**  
**ANZALDUAS CANAL NEAR REYNOSA, TAMAULIPAS**

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank at latitude 26°07'50", longitude 98°20'10", 0.5 canal mile (0.8 km) from the canal intake, and about 5 miles (8 km) northwest of Reynosa, Tamaulipas. The canal intake is immediately upstream from Anzalduas Dam at river mile 170.3 (274.1 km), 102.2 river miles (164.5 km) downstream from Falcon Dam. The zero of the gage is 86.32 feet (26.31 m) above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 82 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1952 through 1981.

**REMARKS:** Diversions by this canal are for irrigation and domestic use in Mexico and for conveying water for storage in Culebrón, Villa Cardenas, and Palito Blanco Reservoirs about 23 canal miles (37.0 km) downstream from this station. During 1981, 349,738 acres (141,534 ha) were irrigated with water delivered through this canal. More than one crop per year was grown on parts of this land. Flow at this canal station is affected by backwater from the operation of canal gates 4.5 miles (7.2 km), 11.3 miles (18.2 km), and 22.5 miles (36.2 km) below this station. During 1981, there was no water returned to the Rio Grande through Poniente Drain.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 10,950 second-feet (310 m<sup>3</sup>/sec) on June 2, 1957 with a gage height of 16.01 feet (4.88 m). Min. no flow occurs frequently.

Average Flow in Second-Feet (Cubic Meters per Second)

|          |                   |              |                 |                |
|----------|-------------------|--------------|-----------------|----------------|
| Daily:   | Max. 9,350 (265)  | May 29, 1957 | Min. 0          | Frequently     |
| Monthly: | Max. 6,250 (177)  | May 1978     | Min. 0          | Several months |
| Yearly:  | Max. 1,980 (56.1) | 1959         | Min. 150 (4.26) | 1952           |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.           | Feb.            | March          | April   | May             | June    | July            | Aug.    | Sept.          | Oct.    | Nov.  | Dec. |
|------------|----------------|-----------------|----------------|---------|-----------------|---------|-----------------|---------|----------------|---------|-------|------|
| 1          | 1.4            | 1.4             | 1.4            | 1.4     | 3,740           | 2,580 * | 381             | 1.4     | 1,150 *        | 1.4     | 452 * |      |
| 2          | 1.4            | 178             | 180            | 406     | 4,410           | 2,040 * | 191             | 1.4     | 904            | 1.4     | 274 * |      |
| 3          | 1.4            | 321 *           | 350 *          | 816     | 5,010           | 1,770   | 1.4             | 240     | 1.4            | 713     | 1.4   |      |
| 4          | 1.4            | 315             | 321            | 819     | 3,410 *         | 1,420 * | 1.4             | 480 *   | 1.4            | 710     | 1.4   |      |
| 5          | 1.4            | 157             | 159 *          | 406     | 3,250           | 1,240   | 1.4             | 484     | 1.4            | 636     | 1.4   |      |
| 6          | 1.4            | 1.4             | 1.4            | 1.4     | 2,240           | 1,060   | 1.4             | 657     | 1.4            | 653 *   | 1.4   |      |
| 7          | 194            | 1.4             | 1.4            | 1.4     | 1,260 *         | 1,040   | 1.4             | 1,290 * | 251            | 682     | 1.4   |      |
| 8          | 350            | 1.4             | 1.4            | 265     | 1,250           | 978 *   | 1.4             | 1,590   | 498            | 682 *   | 1.4   |      |
| 9          | 353 *          | 1.4             | 1.4            | 523 *   | 1,240           | 890     | 1.4             | 2,120   | 494 *          | 869     | 1.4   |      |
| 10         | 360            | 1.4             | 1.4            | 607     | 1,350           | 1,220   | 1.4             | 2,340 * | 424            | 1,060   | 1.4   |      |
| 11         | 360            | 1.4             | 184            | 604     | 1,750           | 1,540 * | 1.4             | 2,210 * | 353            | 1,060   | 1.4   |      |
| 12         | 321            | 1.4             | 360 *          | 607     | 2,760 *         | 1,560   | 1.4             | 2,540   | 350            | 1,110   | 144   |      |
| 13         | 332 *          | 177             | 360            | 650 *   | 3,460           | 1,570   | 1.4             | 2,560 * | 353            | 1,140 * | 360 * |      |
| 14         | 360            | 360             | 367            | 699 *   | 4,030           | 1,620   | 1.4             | 2,440 * | 350            | 1,140   | 367   |      |
| 15         | 374            | 396             | 184            | 795     | 4,800 *         | 1,110 * | 311             | 2,480   | 350 *          | 1,180   | 459   |      |
| 16         | 381 *          | 198 *           | 1.4            | 883     | 5,330           | 682 *   | 773 *           | 2,480   | 353            | 1,220 * | 554 * |      |
| 17         | 385            | 1.4             | 1.4            | 883     | 5,440           | 1,150   | 773             | 2,480 * | 388            | 1,060   | 388   |      |
| 18         | 385            | 1.4             | 1.4            | 893     | 5,790 *         | 678 *   | 470             | 2,240   | 388 *          | 1,590   | 392 * |      |
| 19         | 470            | 1.4             | 1.4            | 890     | 6,500           | 618     | 1.4             | 2,090 * | 392            | 1,590 * | 392   |      |
| 20         | 533            | 1.4             | 205            | 1,010   | 7,060 *         | 597     | 1.4             | 2,210   | 396            | 1,600   | 388   |      |
| 21         | 267            | 240             | 396            | 1,140 * | 7,450 *         | 614     | 1.4             | 2,230 * | 406 *          | 1,570   | 427   |      |
| 22         | 1.4            | 494             | 403            | 1,180   | 7,800 *         | 618     | 1.4             | 2,420   | 459            | 1,670 * | 459   |      |
| 23         | 1.4            | 501 *           | 406 *          | 1,910   | 7,800           | 607     | 1.4             | 2,420   | 713            | 1,120 * | 512 * |      |
| 24         | 1.4            | 251             | 205            | 2,560 * | 7,630           | 586     | 1.4             | 2,410 * | 819 *          | 353     | 554   |      |
| 25         | 1.4            | 1.4             | 1.4            | 3,210   | 7,030 *         | 576 *   | 1.4             | 2,460   | 777            | 360     | 614 * |      |
| 26         | 1.4            | 1.4             | 1.4            | 3,260   | 6,110 *         | 406     | 1.4             | 2,150 * | 788            | 360 *   | 756   |      |
| 27         | 1.4            | 1.4             | 1.4            | 3,260 * | 5,440           | 360     | 1.4             | 1,620 * | 975            | 360     | 597 * |      |
| 28         | 1.4            | 1.4             | 1.4            | 3,260   | 4,940 *         | 392     | 1.4             | 1,200 * | 1,170 *        | 184     | 438   |      |
| 29         | 1.4            | 1.4             | 1.4            | 3,250   | 4,700 *         | 385 *   | 1.4             | 565     | 1,170          | 1.4     | 438   |      |
| 30         | 1.4            | 1.4             | 1.4            | 3,290   | 3,880           | 381     | 1.4             | 1.4     | 1,230          | 1.4     | 190   |      |
| 31         | 1.4            | 1.4             | 1.4            | 3,100   | 1.4             | 1.4     | 1.4             | 1.4     | 1.4            | 1.4     | 399 * |      |
| <b>Sum</b> | <b>3,610.4</b> | <b>38,080.2</b> | <b>30,288</b>  |         | <b>50,411.6</b> |         | <b>26,730.2</b> |         | <b>3,116.4</b> |         |       |      |
|            | <b>5,447.4</b> | <b>4,103.8</b>  | <b>139,960</b> |         | <b>2,934.0</b>  |         | <b>13,855.4</b> |         | <b>8,692.4</b> |         |       |      |

| Current Year 1981 |  |       |                                |       | Period 1954-1981    |                 |                           |         |           |
|-------------------|--|-------|--------------------------------|-------|---------------------|-----------------|---------------------------|---------|-----------|
| Month             | Average Rainfall Inches**                                |       | θ Extreme Second-Feet          |       | Average Second-Feet | Total Acre-Feet | Acre-Feet                 |         |           |
|                   | 1954-1981  | 1981  | Day                            | Day   |                     |                 | Average                   | Maximum | Minimum   |
| Jan.              | 1.34   | 3.07  | 20                             | 533   | 1.1                 | 1.4             | 176                       | 10,808  | 97,252    |
| Feb.              | 1.34   | 1.14  | 23                             | 501   | 1.1                 | 1.4             | 129                       | 7,163   | 95,464    |
| Mar.              | .71  | 2.48  | 23                             | 406   | 1.1                 | 1.4             | 132                       | 8,140   | 42,237    |
| Apr.              | 1.85   | 1.34  | 30                             | 3,290 | 1.1                 | 1.4             | 1,270                     | 75,497  | 122,275   |
| May               | 2.44   | 6.18  | 122                            | 7,800 | 9                   | 1,240           | 4,520                     | 277,667 | 199,481   |
| June              | 2.95   | 2.83  | 1                              | 2,580 | 27                  | 360             | 1,010                     | 60,085  | 384,058   |
| July              | 1.93   | 4.72  | 116                            | 773   | 1 3                 | 1.4             | 94.6                      | 5,821   | 162,400   |
| Aug.              | 3.03   | 5.00  | 13                             | 2,560 | 1 1                 | 1.4             | 1,620                     | 99,966  | 84,507    |
| Sept.             | 4.85   | 1.61  | 30                             | 1,230 | 1 1                 | 1.4             | 463                       | 27,481  | 63,814    |
| Oct.              | 2.95   | 3.23  | 222                            | 1,670 | 129                 | 1.4             | 862                       | 53,005  | 58,418    |
| Nov.              | 1.34   | .16   | 26                             | 756   | 1 1                 | 1.4             | 290                       | 17,246  | 12,851    |
| Dec.              | 1.10   | .24   | 1                              | 452   | 1 3                 | 1.4             | 101                       | 6,179   | 23,692    |
|                   | 25.83  | 32.00 |                                | 7,800 |                     | 1.4             | 897                       | 649,058 | 951,201   |
|                   | Millimeters  |       | Cubic Meters per Second        |       |                     |                 | Thousands of Cubic Meters |         |           |
|                   | 656  | 813   |                                | 221   |                     | 0.04            | 25.4                      | 800,605 | 1,173,294 |
|                   | Discharge measurement made on this day<br>and other days |       | ** Average of several stations |       |                     |                 | θ Mean daily              |         |           |
|                   |  |       |                                |       |                     |                 |                           |         |           |

## RIO GRANDE BELOW ANZALDUAS DAM NEAR REYNOSA, TAMAULIPAS AND MISSION, TEXAS

**DESCRIPTION:** Cableway, gravity well, water-stage recorder, and selsyn-type transmitter, located on the right bank at latitude 26°07'50", longitude 98°19'55", and river mile 169.8 (273.3 km); 0.5 river mile (0.8 km) downstream from Anzalduas Dam, about 4.5 miles (7 km) northwest of Reynosa, Tamaulipas, and 10.3 river miles (16.6 km) upstream from the international highway bridge between Hidalgo, Texas and Reynosa, Tamaulipas.

The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 109 discharge measurements during the year, 108 by the Mexican Section and 1 by the United States Section of the Commission, and a continuous record of gage heights. Records available: 1952 through 1981.

**REMARKS:** Except during local storms, flow at this station is controlled largely by releases from Falcon Reservoir and by diversions into Anzalduas Canal. Excessive upstream flood flows are partly diverted into the United States floodway system inlet at Anzalduas Dam before reaching this station. Prior to January 1, 1968 the zero of the gage was 82.61 feet (25.18 m) above mean sea level, U. S. C. & G. S. datum. The transmitter relays gage height data to the Anzalduas Dam control room.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 131,000 second-feet (3,700 m<sup>3</sup>/sec) on September 24, 1967 with a gage height of 30.51 feet (9.30 m). Min. periods of no flow have occurred on several occasions in 1953, 1954, 1956, and 1957.

| Average Flow in Second-Feet (Cubic Meters per Second) |      |                 |  |                |  |                 |  |              |  |  |  |
|---|------|-----------------|--|----------------|--|-----------------|--|--------------|--|--|--|
| Daily:  | Max. | 121,000 (3,440) |  | Sept. 25, 1967 |  | Min. 0          |  |              |  |  |  |
| Monthly:  | Max. | 37,830 (1,070)  |  | Oct. 1958      |  | Min. 5.5 (0.16) |  | Occasionally |  |  |  |
| Yearly:   | Max. | 6,410 (182)     |  | 1958           |  | Min. 158 (4.49) |  | March 1957   |  |  |  |

### Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.    | Feb.          | March   | April         | May      | June           | July     | Aug.          | Sept.   | Oct.           | Nov.    | Dec.          |
|------------|---------|---------------|---------|---------------|----------|----------------|----------|---------------|---------|----------------|---------|---------------|
| 1          | 653     | 291           | 470     | 1,150         | 1,150    | 9,460 *        | 14,300 * | 2,690         | 1,860   | 4,980 *        | 4,870   | 1,780 *       |
| 2          | 590 *   | 374 *         | 738     | 1,260 *       | 2,420    | 8,650          | 14,500   | 2,800         | 1,790   | 5,470          | 3,670   | 1,390         |
| 3          | 445     | 360           | 812     | 1,190         | 2,730    | 8,900          | 14,400 * | 2,750 *       | 1,980 * | 6,180          | 2,800 * | 1,200 *       |
| 4          | 643     | 357           | 756 *   | 1,170         | 7,520    | 8,970          | 13,200   | 2,300         | 1,970   | 5,440          | 3,050   | 1,750         |
| 5          | 727 *   | 392           | 745     | 1,390         | 8,440    | 8,860          | 13,300   | 2,000         | 2,650   | 3,990          | 2,320 * | 2,460         |
| 6          | 964     | 289           | 830 *   | 1,690 *       | 7,560 *  | 8,860          | 10,900   | 2,130 *       | 2,870   | 3,280 *        | 1,780   | 2,200         |
| 7          | 1,190   | 264           | 784     | 1,920         | 8,330    | 8,790 *        | 8,790 *  | 2,280         | 4,660   | 2,480          | 1,130   | 1,950         |
| 8          | 1,250   | 266           | 840     | 2,100         | 8,300    | 7,910 *        | 8,720    | 2,380         | 5,090 * | 1,660 *        | 1,090   | 1,760 *       |
| 9          | 1,260 * | 335 *         | 901 *   | 2,260 *       | 12,500   | 5,540          | 9,750 *  | 2,480         | 5,160   | 1,510          | 1,270   | 1,820         |
| 10         | 1,420   | 420           | 883     | 2,340         | 13,200   | 3,280          | 11,000   | 2,370 *       | 6,070 * | 2,230          | 1,480 * | 1,470 *       |
| 11         | 1,620   | 505           | 632     | 2,450         | 13,000 * | 1,960 *        | 13,900   | 2,250         | 7,660   | 3,670          | 2,270   | 1,490         |
| 12         | 1,760   | 480 *         | 583     | 2,560         | 11,000   | 1,260 *        | 14,100   | 1,970         | 8,020   | 4,240          | 2,020 * | 1,450         |
| 13         | 1,740   | 438           | 480 *   | 2,680 *       | 10,600   | 1,380          | 14,000 * | 1,770 *       | 7,060   | 4,270 *        | 1,850   | 2,090         |
| 14         | 1,120 * | 336           | 332     | 2,630         | 9,850    | 2,670          | 13,500   | 1,800         | 6,530   | 5,970          | 1,790   | 2,860         |
| 15         | 544     | 340           | 328     | 2,650 *       | 9,920 *  | 4,410 *        | 10,300   | 1,800         | 4,340   | 7,130          | 1,850   | 2,270 *       |
| 16         | 477 *   | 720 *         | 335 *   | 2,700         | 9,430    | 5,400          | 4,130    | 1,710         | 3,330   | 7,490 *        | 1,770   | 1,310         |
| 17         | 374     | 1,020         | 343     | 2,800         | 9,710    | 12,200         | 1,010    | 1,640 *       | 2,970 * | 6,140          | 6,690   | 1,300 *       |
| 18         | 378     | 1,870         | 330     | 2,930         | 8,580 *  | 14,700 *       | 1,020    | 1,630         | 4,380   | 4,520          | 1,640   | 1,780         |
| 19         | 364     | 1,640 *       | 340     | 3,110         | 7,240 *  | 13,200 *       | 1,600    | 1,570         | 6,430   | 3,600          | 1,620 * | 1,960         |
| 20         | 364 *   | 1,920         | 285 *   | 3,450 *       | 6,500    | 13,300         | 1,250 *  | 1,580         | 5,970   | 2,580 *        | 1,610   | 1,980         |
| 21         | 348     | 2,400         | 209     | 3,300         | 6,180 *  | 13,500         | 3,850    | 1,580 *       | 6,000 * | 1,710          | 1,740   | 2,000 *       |
| 22         | 348     | 1,680         | 332     | 3,050         | 6,040    | 14,100         | 2,140    | 1,650         | 6,040   | 1,820          | 1,710   | 1,650         |
| 23         | 333 *   | 1,530 *       | 491     | 3,110 *       | 6,070    | 14,100 *       | 3,310 *  | 1,530         | 6,220   | 3,110 *        | 1,650   | 1,890         |
| 24         | 336     | 692 *         | 509 *   | 4,200         | 6,140    | 14,300 *       | 4,240    | 1,420 *       | 6,670 * | 7,350          | 1,270 * | 2,110         |
| 25         | 364     | 636           | 512     | 4,590         | 6,250 *  | 14,400         | 3,290    | 1,330         | 6,850   | 7,950          | 1,220   | 2,320         |
| 26         | 445 *   | 622           | 597     | 2,560         | 6,460    | 14,500         | 3,010    | 1,290         | 7,100   | 7,880          | 1,060 * | 2,220         |
| 27         | 494     | 519 *         | 872 *   | 1,360         | 6,140    | 15,000         | 2,750 *  | 1,180 *       | 6,950   | 8,020 *        | 1,080   | 2,140         |
| 28         | 477     | 396           | 1,010   | 1,530 *       | 5,790 *  | 15,000         | 2,830    | 978           | 6,460 * | 8,620          | 1,490   | 1,850 *       |
| 29         | 487 *   |               | 1,010   | 629           | 5,300    | 14,800 *       | 3,280    | 1,510         | 4,660   | 8,760 *        | 1,750   | 1,790         |
| 30         | 431     |               | 1,000 * | 607 *         | 8,580    | 14,300         | 2,930 *  | 3,100         | 4,450   | 7,800          | 1,930   | 1,570         |
| 31         | 199     |               | 975     |               | 11,100   |                | 2,590    | 3,130 *       |         | 6,500          |         | 1,400         |
| <b>Sum</b> |         | <b>21,092</b> |         | <b>69,366</b> |          | <b>293,240</b> |          | <b>60,598</b> |         | <b>156,350</b> |         | <b>57,210</b> |
|            |         | 22,145        |         | 19,264        |          | 241,860        |          | 228,790       |         | 152,200        |         | 56,470        |

### Current Year 1981

| Month | Extreme Gage Feet |       |     | Extreme Second-Feet            |     | Total Acre-Feet | Period 1954-1981                 |           |           |  |
|-------|-------------------|-------|-----|--------------------------------|-----|-----------------|----------------------------------|-----------|-----------|--|
|       | High              |       | Low | High                           | Low |                 | Acre-Feet                        |           |           |  |
|       | High              | Low   | Day |                                |     |                 | Average                          | Maximum   | Minimum   |  |
| Jan.  | 82.35             | 79.20 | 12  | 2,170                          | 31  | 155             | 713                              | 43,905    | 103,223   |  |
| Feb.  | 83.33             | 79.27 | 21  | 3,000                          | 1   | 246             | 752                              | 41,842    | 75,349    |  |
| Mar.  | 81.82             | 78.94 | 27  | 1,720                          | 20  | 170             | 622                              | 38,206    | 81,642    |  |
| Apr.  | 85.70             | 80.05 | 124 | 5,300                          | 29  | 565             | 2,310                            | 137,604   | 111,306   |  |
| May   | 93.31             | 80.18 | 11  | 13,400                         | 1   | 629             | 7,800                            | 479,551   | 147,478   |  |
| June  | 95.08             | 81.17 | 18  | 16,000                         | 12  | 1,140           | 9,780                            | 581,551   | 193,053   |  |
| July  | 94.42             | 80.61 | 3   | 14,900                         | 17  | 865             | 7,380                            | 453,992   | 680,021   |  |
| Aug.  | 84.12             | 80.05 | 31  | 3,740                          | 28  | 565             | 1,960                            | 120,197   | 557,022   |  |
| Sept. | 88.81             | 81.17 | 12  | 8,260                          | 2   | 1,220           | 5,090                            | 301,888   | 145,159   |  |
| Oct.  | 89.83             | 80.09 | 29  | 9,180                          | 8   | 583             | 5,050                            | 310,112   | 2,326,000 |  |
| Nov.  | 86.29             | 79.46 | 1   | 5,760                          | 24  | 325             | 1,880                            | 112,038   | 144,075   |  |
| Dec.  | 83.73             | 79.72 | 113 | 3,370                          | 22  | 424             | 1,840                            | 113,431   | 108,460   |  |
|       | 95.08             | 78.94 |     | 16,000                         |     | 155             | 3,780                            | 2,734,317 | 1,817,269 |  |
|       | <b>Meters</b>     |       |     | <b>Cubic Meters per Second</b> |     |                 | <b>Thousands of Cubic Meters</b> |           |           |  |
|       | 28.98             | 24.06 |     | 452                            |     | 4.40            | 107                              | 3,372,746 | 2,241,576 |  |
|       |                   |       |     |                                |     |                 |                                  | 5,724,004 | 141,538   |  |

\* Discharge measurement made on this day      ! And other days

## RIO GRANDE FLOODWAY DISCHARGES LOWER RIO GRANDE VALLEY

### On the United States Side

Part of the excess water from floods entering the Lower Rio Grande Valley is diverted from the river through the United States floodway system with the inlet located at Anzalduas Dam near Mission, Texas.

Floodwater entering the system is measured first at the Banker Floodway Station at Anzalduas Dam near Mission and again 25.2 miles (40.6 km) downstream at the Main Floodway Station on Farm Road No. 88 bridge south of Weslaco. At a point 3 miles (4.8 km) southwest of Mercedes the floodway divides, one channel going north-eastward through the Arroyo Colorado Floodway to the Gulf of Mexico, and the other going to the gulf via the North Floodway, traveling first northward and then eastward to the gulf. At the point of diversion, a divisor dike, which runs longitudinally in the Main Floodway, divides and controls the flows into the Arroyo Colorado Floodway and the North Floodway. The flow of the Arroyo Colorado is measured at El Fuste Siphon south of Mercedes and farther downstream at the bridge on U. S. Highway No. 83 south of Harlingen. The North Floodway flow is measured at the bridge on old U. S. Highway No. 83 west of Mercedes and farther downstream at the bridge on U. S. Highway No. 77 near Sebastian.

In 1981, no flood flow was diverted through this floodway system.

### On the Mexican Side

Part of the excess water from floods entering the Lower Rio Grande Valley is diverted from the river through the Mexican floodway system, with the inlet located 37.1 miles (59.7 km) downstream from Anzalduas Dam and, when necessary, through Anzalduas Canal located at Anzalduas Dam.

Floodwater entering the system through the Retamal Inlet flows into Culebron and Villa Cardenas Lakes through the Retamal Floodway, while flood flows entering the canal at Anzalduas Dam reach these lakes via the Culebron and Retamal Canals from where it flows in a southeastwardly direction via Floodway No. 1 into the Gulf of Mexico.

The Retamal Floodway replaces the previously used floodway system, which consisted of Retamal Canal, San Rafael Floodway, and Floodway No. 2.

In 1981, no flood flow was diverted through Retamal Floodway or Anzalduas Canal.

**DIVERSIONS FROM THE RIO GRANDE**  
**UNITED STATES SIDE, ANZALDUAS DAM TO PROGRESO**

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1981, 130,445 irrigable acres (52,790 ha) and several towns and rural homes were allotted Rio Grande water in the river reach between Anzalduas Dam and the Progreso International Bridge. Such irrigable area was 17.9% of the total irrigable acres (ha) below Falcon Dam allotted Rio Grande water.

The total diversion during 1981 in this river reach was 189,655 acre-feet (233,940,000 m<sup>3</sup>), or 21.9% of the total water diverted from the Rio Grande below Falcon Dam. About 95% of the water diverted in this river reach was determined by the International Boundary and Water Commission through records of discharge obtained by means of flow meters, and by deflection meters developed by the Commission. The records for the rest of these diversions were furnished by the Rio Grande Watermaster and were determined from records of discharge obtained by means of flow meters. More than one crop per year is often grown on parts of this land.

| Average Flow in Second-Feet (Cubic Meters per Second) |      |              |                    |      |                  |              |
|---|------|--------------|--------------------|------|------------------|--------------|
| Daily:  | Max. | 1,120 (31.7) | June 16 & 17, 1965 | Min. | 0                | Occasionally |
| Monthly:  | Max. | 749 (21.2)   | June               | 1969 | Min. 13.3 (0.38) | May 1972     |
| Yearly:   | Max. | 335 (9.49)   |                    | 1978 | Min. 167 (4.73)  | 1970         |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.           | Feb.            | March          | April          | May            | June            | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|----------------|-----------------|----------------|----------------|----------------|-----------------|------|------|-------|------|------|------|
| 1          | 205            | 1.1             | 77.0           | 353            | 62.1           | 87.3            | 269  | 519  | 26.7  | 346  | 27.2 | 397  |
| 2          | 233            | 74.1            | 233            | 436            | 3.0            | 146             | 215  | 431  | 213   | 317  | 125  | 422  |
| 3          | 146            | 91.3            | 336            | 456            | 2.7            | 97.1            | 204  | 548  | 140   | 194  | 191  | 464  |
| 4          | 77.0           | 104             | 393            | 358            | 104            | 151             | 169  | 488  | 135   | 182  | 156  | 409  |
| 5          | 294            | 101             | 428            | 281            | 28.6           | 184             | 161  | 506  | 4.6   | 316  | 252  | 431  |
| 6          | 295            | 59.4            | 375            | 439            | 80.3           | 128             | 105  | 516  | 2.0   | 305  | 274  | 183  |
| 7          | 254            | 0               | 338            | 548            | 28.0           | 150             | 170  | 523  | 179   | 354  | 157  | 374  |
| 8          | 225            | 0               | 382            | 644            | 66.8           | 215             | 42.5 | 434  | 248   | 277  | 36.7 | 424  |
| 9          | 184            | 46.3            | 376            | 679            | 0              | 334             | 94.3 | 349  | 268   | 314  | 162  | 438  |
| 10         | 67.4           | 84.4            | 346            | 677            | 0              | 429             | 90.0 | 469  | 256   | 260  | 205  | 417  |
| 11         | 7.5            | 173             | 229            | 588            | 12.3           | 508             | 12.9 | 495  | 304   | 204  | 322  | 337  |
| 12         | 79.8           | 168             | 82.5           | 479            | 97.1           | 485             | 22.0 | 514  | 243   | 376  | 361  | 214  |
| 13         | 86.6           | 73.8            | 42.6           | 633            | 17.0           | 364             | 135  | 476  | 196   | 418  | 306  | 233  |
| 14         | 163            | 6.7             | 0              | 676            | 0              | 395             | 131  | 453  | 312   | 520  | 150  | 378  |
| 15         | 119            | 6.7             | 0              | 608            | 79.8           | 486             | 181  | 366  | 370   | 541  | 102  | 356  |
| 16         | 132            | 22.6            | 57.9           | 596            | 15.5           | 452             | 188  | 273  | 404   | 518  | 281  | 373  |
| 17         | 0              | 31.2            | 88.3           | 557            | 0              | 453             | 279  | 455  | 397   | 437  | 409  | 374  |
| 18         | 0              | 22.8            | 63.5           | 351            | 21.3           | 380             | 170  | 462  | 382   | 231  | 411  | 426  |
| 19         | 40.4           | 26.2            | 42.1           | 261            | 223            | 470             | 170  | 452  | 382   | 356  | 331  | 322  |
| 20         | 14.7           | 87.5            | 78.3           | 530            | 231            | 334             | 402  | 445  | 290   | 384  | 363  | 281  |
| 21         | 29.8           | 214             | 37.6           | 718            | 236            | 345             | 704  | 438  | 408   | 353  | 252  | 329  |
| 22         | 0              | 57.0            | 34.8           | 775            | 218            | 483             | 642  | 390  | 451   | 364  | 164  | 339  |
| 23         | 29.1           | 120             | 16.1           | 752            | 212            | 556             | 763  | 286  | 509   | 188  | 299  | 289  |
| 24         | 0              | 216             | 222            | 478            | 173            | 518             | 776  | 440  | 604   | 1.7  | 441  | 149  |
| 25         | 0              | 245             | 250            | 102            | 175            | 410             | 642  | 388  | 631   | 1.7  | 365  | 14.0 |
| 26         | 43.0           | 234             | 301            | 16.5           | 240            | 252             | 321  | 266  | 525   | 95.2 | 97.0 | 137  |
| 27         | 69.6           | 188             | 336            | 46.3           | 264            | 213             | 545  | 147  | 484   | 126  | 278  | 39.1 |
| 28         | 72.9           | 82.9            | 298            | 39.9           | 255            | 161             | 649  | 104  | 498   | 207  | 291  | 323  |
| 29         | 103            | 260             | 19.0           | 283            | 260            | 485             | 0    | 526  | 156   | 174  | 464  |      |
| 30         | 68.6           | 276             | 3.0            | 134            | 262            | 532             | 0    | 401  | 191   | 348  | 419  |      |
| 31         | 6.5            | 342             | 30.2           |                |                | 521             | 210  |      | 65.9  |      | 309  |      |
| <b>Sum</b> | <b>2,537.0</b> | <b>13,099.7</b> | <b>9,708.4</b> | <b>11,843</b>  | <b>8,629.5</b> | <b>10,064.1</b> |      |      |       |      |      |      |
|            | <b>3,045.9</b> | <b>6,486.6</b>  | <b>3,292.7</b> | <b>9,790.7</b> | <b>9,789.3</b> | <b>7,330.9</b>  |      |      |       |      |      |      |

**Current Year 1981**

| Month  | Average Rainfall<br>Inches** |       | Extreme Second-Feet |                                | Average<br>Second-<br>Foot | Total<br>Acre-Feet | Period 1957-1981                 |                  |         |
|--|------------------------------|-------|---------------------|--------------------------------|----------------------------|--------------------|----------------------------------|------------------|---------|
|  | 1957-1981                    | 1981  | Day                 | Day                            |                            |                    | Average                          | Maximum          | Minimum |
| Jan.   | 1.49                         | 2.85  | 6                   | 295                            | ! 17                       | 0                  | 98.3                             | 6,041            | 11,648  |
| Feb.   | 1.19                         | .72   | 25                  | 245                            | ! 7                        | 0                  | 90.6                             | 5,032            | 9,634   |
| Mar.   | .72                          | 2.10  | 5                   | 428                            | ! 14                       | 0                  | 209                              | 12,866           | 16,859  |
| Apr.   | 1.62                         | 2.84  | 22                  | 775                            | 30                         | 3.0                | 437                              | 25,983           | 19,579  |
| May  | 2.62                         | 6.38  | 29                  | 283                            | ! 9                        | 0                  | 106                              | 6,531            | 21,134  |
| June   | 2.79                         | 2.89  | 23                  | 556                            | 1                          | 87.3               | 324                              | 19,256           | 27,211  |
| July   | 1.66                         | 2.18  | 24                  | 776                            | 11                         | 12.9               | 316                              | 19,420           | 22,863  |
| Aug.   | 2.69                         | 3.91  | 3                   | 548                            | ! 29                       | 0                  | 382                              | 23,490           | 16,192  |
| Sept.  | 4.33                         | .99   | 25                  | 631                            | 6                          | 2.0                | 326                              | 19,417           | 11,822  |
| Oct.   | 2.90                         | 3.23  | 16                  | 548                            | ! 24                       | 1.7                | 278                              | 17,116           | 14,134  |
| Nov.   | 1.22                         | .09   | 24                  | 441                            | 1                          | 27.2               | 244                              | 14,541           | 10,783  |
| Dec.   | 1.08                         | .20   | ! 3                 | 464                            | 5                          | 14.0               | 325                              | 19,962           | 10,086  |
|  | 24.31                        | 28.38 |                     | 776                            | 0                          | 262                | 189,655                          | 192,245          | 253,130 |
| <b>Yearly</b>  | <b>Millimeters</b>           |       |                     | <b>Cubic Meters per Second</b> |                            |                    | <b>Thousands of Cubic Meters</b> |                  |         |
|  | 617                          | 721   |                     | 22.0                           | 0                          | 7.42               | 233,940                          | 237,131          | 312,236 |
| ** United States side - average of several stations in the reach |                              |       |                     |                                |                            |                    | 0 Mean daily                     | ! And other days |         |

**DIVERSIONS FROM THE RIO GRANDE**  
**UNITED STATES SIDE, PROGRESO TO SAN BENITO**

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1981, 320,369 irrigable acres (129,650 ha) and several towns and rural homes were allotted Rio Grande water in the river reach between the gaging stations at Progreso and San Benito. Such irrigable area was 43.8% of the total irrigable acres (ha) below Falcon Dam allotted Rio Grande water.

The total diversion during 1981 in this river reach was 367,860 acre-feet (453,755,000 m<sup>3</sup>), or 42.6% of the total water diverted from the Rio Grande below Falcon Dam. About 99% of the water diverted in this river reach was determined by the International Boundary and Water Commission through records of discharge obtained by means of flow meters, by open channel rating stations, and by deflection meters developed by the Commission. The records for the rest of these diversions were furnished by the Rio Grande Watermaster and were determined from records of discharge obtained by means of flow meters. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

| Average Flow in Second-Feet (Cubic Meters per Second) |      |       |        |               |  |                  |  |              |  |
|---|------|-------|--------|---------------|--|------------------|--|--------------|--|
| Daily:  | Max. | 2,750 | (77.9) | June 15, 1965 |  | Min. 0           |  | Occasionally |  |
| Monthly:  | Max. | 2,080 | (58.9) | June 1960     |  | Min. 53.5 (1.52) |  | March 1957   |  |
| Yearly:   | Max. | 808   | (22.9) | 1980          |  | Min. 367 (10.4)  |  | 1968         |  |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan. | Feb.     | March   | April   | May  | June     | July     | Aug.  | Sept. | Oct.     | Nov. | Dec. |
|------------|------|----------|---------|---------|------|----------|----------|-------|-------|----------|------|------|
| 1          | 237  | 59.8     | 177     | 533     | 320  | 248      | 769      | 1,520 | 209   | 641      | 143  | 352  |
| 2          | 255  | 63.0     | 145     | 653     | 299  | 422      | 662      | 1,480 | 62.1  | 525      | 128  | 484  |
| 3          | 164  | 64.1     | 292     | 770     | 74.9 | 299      | 499      | 1,590 | 65.1  | 292      | 106  | 508  |
| 4          | 119  | 55.1     | 391     | 782     | 16.6 | 155      | 344      | 1,570 | 272   | 298      | 105  | 564  |
| 5          | 304  | 51.6     | 354     | 754     | 21.3 | 184      | 285      | 1,620 | 227   | 548      | 309  | 593  |
| 6          | 417  | 51.9     | 322     | 927     | 151  | 310      | 301      | 1,390 | 56.8  | 636      | 430  | 346  |
| 7          | 604  | 58.0     | 315     | 1,030   | 222  | 174      | 75.0     | 1,340 | 183   | 653      | 277  | 440  |
| 8          | 786  | 38.5     | 276     | 1,060   | 190  | 214      | 37.0     | 1,490 | 106   | 585      | 186  | 754  |
| 9          | 815  | 172      | 294     | 1,130   | 22.0 | 439      | 49.7     | 1,490 | 106   | 549      | 165  | 683  |
| 10         | 793  | 231      | 280     | 1,190   | 25.0 | 658      | 238      | 1,380 | 133   | 532      | 185  | 638  |
| 11         | 721  | 235      | 261     | 1,240   | 88.3 | 683      | 351      | 1,380 | 138   | 539      | 285  | 574  |
| 12         | 861  | 236      | 272     | 1,310   | 86.9 | 834      | 55.1     | 1,390 | 82.0  | 560      | 368  | 541  |
| 13         | 786  | 237      | 206     | 1,540   | 42.3 | 773      | 142      | 1,290 | 57.3  | 554      | 283  | 524  |
| 14         | 780  | 232      | 68.2    | 1,500   | 66.7 | 498      | 140      | 1,040 | 256   | 572      | 141  | 506  |
| 15         | 577  | 232      | 88.4    | 1,560   | 44.3 | 491      | 318      | 1,020 | 448   | 639      | 47.4 | 332  |
| 16         | 363  | 242      | 64.4    | 1,670   | 65.6 | 456      | 497      | 821   | 536   | 812      | 250  | 438  |
| 17         | 319  | 228      | 52.1    | 1,660   | 43.8 | 761      | 530      | 992   | 553   | 887      | 330  | 484  |
| 18         | 282  | 235      | 52.3    | 1,670   | 261  | 1,090    | 380      | 965   | 428   | 866      | 329  | 501  |
| 19         | 114  | 248      | 53.3    | 1,620   | 473  | 1,200    | 342      | 985   | 173   | 803      | 323  | 510  |
| 20         | 87.3 | 224      | 55.0    | 1,710   | 682  | 1,190    | 372      | 1,040 | 111   | 729      | 171  | 494  |
| 21         | 126  | 185      | 54.9    | 1,770   | 851  | 1,120    | 496      | 1,010 | 462   | 753      | 43.0 | 498  |
| 22         | 147  | 69.6     | 27.6    | 1,820   | 832  | 1,130    | 560      | 969   | 706   | 762      | 25.1 | 541  |
| 23         | 132  | 160      | 187     | 1,830   | 615  | 1,200    | 625      | 778   | 811   | 528      | 321  | 548  |
| 24         | 121  | 340      | 246     | 1,840   | 414  | 1,240    | 683      | 683   | 1,030 | 287      | 426  | 256  |
| 25         | 128  | 424      | 281     | 1,310   | 336  | 1,080    | 686      | 647   | 1,180 | 169      | 467  | 42.9 |
| 26         | 224  | 430      | 328     | 788     | 157  | 930      | 570      | 610   | 1,080 | 149      | 231  | 266  |
| 27         | 259  | 168      | 340     | 392     | 27.1 | 744      | 807      | 494   | 953   | 188      | 366  | 342  |
| 28         | 271  | 173      | 297     | 289     | 129  | 601      | 1,010    | 339   | 1,060 | 395      | 296  | 700  |
| 29         | 252  | 134      | 241     | 318     | 517  | 977      | 24.4     | 1,080 | 467   | 160      | 863  |      |
| 30         | 256  | 337      | 254     | 110     | 748  | 1,130    | 14.0     | 987   | 391   | 152      | 806  |      |
| 31         | 202  |          | 500     |         | 28.5 |          | 1,380    | 222   |       | 156      |      | 702  |
| <b>Sum</b> |      | 5,143.6  | 34,843  | 20,389  |      | 31,583.4 | 16,485   |       |       | 15,830.9 |      |      |
|            |      | 11,512.3 | 6,751.2 | 7,013.3 |      | 15,310.8 | 13,551.3 |       |       | 7,048.5  |      |      |

## Current Year 1981

| Month  | Average Rainfall<br>Inches** |       | 0 Extreme Second-Feet   |       | Average<br>Second-<br>Feet | Total<br>Acre-Feet        | Period 1957-1981 |         |         |
|--------|------------------------------|-------|-------------------------|-------|----------------------------|---------------------------|------------------|---------|---------|
|        | 1957-1981                    | 1981  | Day                     | High  | Low                        |                           | Average          | Maximum | Minimum |
| Jan.   | 1.63                         | 3.28  | 12                      | 861   | 20                         | 87.3                      | 371              | 22,834  | 36,474  |
| Feb.   | 1.47                         | .87   | 26                      | 430   | 8                          | 38.5                      | 184              | 10,202  | 20,017  |
| Mar.   | .82                          | 3.34  | 31                      | 500   | 22                         | 27.6                      | 218              | 13,391  | 26,416  |
| Apr.   | 1.70                         | 2.43  | 24                      | 1,840 | 29                         | 241                       | 1,160            | 69,110  | 45,459  |
| May    | 2.88                         | 7.71  | 21                      | 851   | 4                          | 16.6                      | 226              | 13,911  | 51,183  |
| June   | 3.28                         | 3.79  | 24                      | 1,240 | 4                          | 155                       | 680              | 40,441  | 68,413  |
| July   | 1.92                         | 2.08  | 31                      | 1,380 | 8                          | 37.0                      | 494              | 30,369  | 41,437  |
| Aug.   | 3.19                         | 5.03  | 5                       | 1,620 | 30                         | 14.0                      | 1,020            | 62,645  | 89,373  |
| Sept.  | 5.15                         | 2.14  | 25                      | 1,180 | 6                          | 56.8                      | 452              | 26,879  | 30,263  |
| Oct.   | 3.26                         | 5.14  | 17                      | 887   | 26                         | 149                       | 532              | 24,698  | 59,400  |
| Nov.   | 1.58                         | .37   | 25                      | 467   | 22                         | 25.1                      | 235              | 13,980  | 18,725  |
| Dec.   | 1.28                         | .27   | 29                      | 863   | 25                         | 42.9                      | 511              | 31,400  | 44,359  |
|        | 28.16                        | 36.45 |                         | 1,840 |                            | 14.0                      | 508              | 367,860 | 586,544 |
| Yearly | Millimeters                  |       | Cubic Meters per Second |       |                            | Thousands of Cubic Meters |                  |         |         |
|        | 715                          | 926   | 52.1                    | 0.40  | 14.4                       | 453,755                   | 500,809          | 723,502 | 328,950 |

\*\* United States side - average of several stations in the reach

0 Mean daily

**RIO GRANDE NEAR SAN BENITO, TEXAS  
AND RAMIREZ, TAMAULIPAS**

**DESCRIPTION:** Cableway, concrete control weir, bubbler gage, water-stage recorders (graphic and digital), and digital transmitter, located on the left bank at latitude 26°01'50", longitude 97°43'40", and river mile 96.8 (155.8 km), 3.9 river miles (6.3 km) downstream from San Benito pumping plant and about 9.5 miles (15.3 km) southwest of San Benito, Texas. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 17 discharge measurements during the year and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: November 26, 1952 through August 25, 1953, and December 1953 through 1981.

**REMARKS:** Except for diversions, tributary inflows, and drainage returns below Falcon Dam, flow at this station after August 25, 1953 was controlled largely by releases from Falcon Reservoir, 178.0 river miles (286.4 km) upstream. Excessive upstream flood flows are partly diverted through the United States and Mexican floodway systems before reaching this station. The transmitter relays gage height data via radio to the Texas Department of Water Resources office in Weslaco. The concrete control weir was constructed in December 1965, and the gage was moved to its present location just above the weir on January 4, 1967.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 25,000 second-feet (708 m<sup>3</sup>/sec) on September 29, 1967 with a gage height of 61.05 feet (18.61 m). Min. no flow occurs frequently.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                   |                |                  |               |
|----------|-------------------|----------------|------------------|---------------|
| Daily:   | Max. 24,800 (702) | Sept. 29, 1967 | Min. 0           | Frequently    |
| Monthly: | Max. 14,300 (405) | Oct. 1971      | Min. 39.5 (1.12) | December 1956 |
| Yearly:  | Max. 3,780 (107)  | 1976           | Min. 200 (5.66)  | 1956          |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.  | Feb.  | March | April   | May      | June    | July     | Aug.    | Sept.   | Oct.    | Nov.  | Dec.   |
|------------|-------|-------|-------|---------|----------|---------|----------|---------|---------|---------|-------|--------|
| 1          | 197   | 285   | 234   | 91.1    | 519      | 8,020   | 11,800   | 756     | 2,910   | 3,440   | 5,760 | 1,170  |
| 2          | 164   | 263   | 210   | 144     | 526      | 7,840   | 11,700 * | 509     | 2,670   | 3,740   | 4,870 | 897    |
| 3          | 213   | 246   | 239   | 132 *   | 1,850    | 6,850   | 12,000   | 417     | 2,100   | 4,450   | 3,810 | 650    |
| 4          | 271   | 275   | 175 * | 82.6    | 2,740    | 6,920   | 12,000   | 565     | 2,000   | 5,120   | 3,010 | 530    |
| 5          | 239 * | 290 * | 125   | 63.9    | 5,440    | 6,990   | 11,800   | 441 *   | 1,930   | 4,770 * | 2,560 | 667    |
| 6          | 150   | 275   | 98.9  | 54.7    | 6,360    | 6,820   | 11,500   | 179     | 2,400   | 3,880   | 2,460 | 1,310  |
| 7          | 111   | 276   | 79.5  | 50.9    | 6,320    | 6,890   | 10,100   | 207     | 2,850   | 3,000   | 1,720 | 1,770  |
| 8          | 89.3  | 278   | 101   | 51.6    | 6,640 *  | 6,530   | 8,510    | 277     | 3,400   | 2,120   | 1,270 | 1,580  |
| 9          | 80.9  | 248   | 144   | 83.3    | 7,520    | 5,830   | 7,880    | 345     | 4,060 * | 1,580   | 918   | 1,510  |
| 10         | 95.0  | 142   | 156   | 59.3    | 10,000   | 4,240   | 8,370    | 512     | 4,200   | 1,170   | 929   | 918    |
| 11         | 314   | 115   | 320   | 85.1    | 11,200   | 2,560   | 9,430    | 611     | 4,170   | 1,240   | 1,230 | 1,720  |
| 12         | 537   | 104   | 441   | 315     | 11,200   | 1,320 * | 11,500   | 477     | 4,130   | 2,050   | 1,500 | 639    |
| 13         | 600   | 118   | 438   | 360     | 9,960    | 251     | 11,700   | 343     | 4,800   | 2,750   | 1,630 | 650    |
| 14         | 646   | 161   | 625   | 403     | 9,500    | 239     | 11,700   | 296     | 5,190   | 3,180   | 1,700 | 1,100  |
| 15         | 509   | 226   | 537   | 240     | 9,110    | 1,200   | 10,900   | 350     | 4,770   | 3,600   | 1,760 | 1,720  |
| 16         | 357 * | 194   | 396   | 231     | 8,760    | 2,510   | 8,970    | 562 *   | 3,780   | 4,340   | 1,730 | 1,850  |
| 17         | 256   | 164   | 364   | 327     | 8,370    | 3,600   | 4,840    | 600 *   | 2,890   | 4,940   | 1,500 | 1,370  |
| 18         | 269   | 445 * | 313 * | 399     | 8,260    | 7,730   | 1,540    | 413     | 2,420   | 4,800   | 1,290 | 886    |
| 19         | 367   | 950   | 284   | 685     | 7,350    | 9,430   | 1,230    | 364     | 3,180   | 4,060 * | 1,210 | 773    |
| 20         | 396   | 1,210 | 285   | 883     | 6,000    | 9,290   | 1,220    | 257     | 4,380   | 3,000   | 1,250 | 862    |
| 21         | 343   | 1,210 | 316   | 784     | 5,300 *  | 9,360   | 1,210    | 259     | 4,590   | 1,770   | 1,390 | 823    |
| 22         | 325   | 1,670 | 302   | 562     | 4,870    | 9,680   | 1,210    | 275     | 4,340 * | 795     | 1,420 | 932    |
| 23         | 318   | 1,550 | 225   | 329     | 4,800    | 9,850   | 1,210    | 452     | 4,270   | 530     | 1,090 | 901    |
| 24         | 325   | 1,090 | 182   | 341     | 4,870    | 9,960   | 1,220    | 703     | 4,170   | 1,410   | 851   | 1,110  |
| 25         | 314   | 509   | 173   | 1,600   | 4,980    | 10,300  | 1,300    | 685     | 4,200   | 3,530   | 809   | 1,580  |
| 26         | 293   | 210   | 135   | 3,110   | 5,050    | 10,800  | 1,240    | 727     | 4,310   | 5,830   | 798   | 1,930  |
| 27         | 225   | 158   | 130   | 2,390   | 5,190    | 11,400  | 1,220    | 713     | 4,660   | 6,710   | 752   | 1,970  |
| 28         | 192   | 254   | 124   | 1,540   | 5,050    | 11,900  | 1,210    | 1,050   | 4,660   | 7,060   | 759   | 1,660  |
| 29         | 208   | 189   | 985   | 4,660   | 12,100   | 1,180   | 1,410    | 4,380   | 7,060   | 1,080   | 1,300 | 996    |
| 30         | 206   | 540   | 837   | 4,630   | 12,100   | 1,230   | 1,510    | 3,710   | 6,890   | 1,290   | 6,460 | 812    |
| 31         | 188   |       | 364   |         | 6,070    |         | 1,210    | 2,710   |         |         |       |        |
| <b>Sum</b> |       |       |       | 12,916  | 17,219.5 | 212,510 |          | 18,975  |         | 115,175 |       | 35,586 |
|            |       |       |       | 8,798.2 | 8,245.4  | 193,095 |          | 192,130 |         | 111,520 |       | 52,346 |

Current Year 1981

| Month  | Extreme Gage Feet |       |     | Extreme Second-Feet     |       | Average Second-Feet | Total Acre-Feet | Period 1954-1981          |           |           |
|--------|-------------------|-------|-----|-------------------------|-------|---------------------|-----------------|---------------------------|-----------|-----------|
|        | High              | Low   | Day | High                    | Low   |                     |                 | Average                   | Maximum   | Minimum   |
| Jan.   | 35.56             | 34.45 | 14  | 667                     | 8     | 78.0                | 284             | 17,448                    | 56,669    | 319,002   |
| Feb.   | 37.93             | 34.45 | 23  | 1,780                   | 11    | 79.5                | 463             | 25,643                    | 49,655    | 363,000   |
| Mar.   | 35.70             | 34.06 | 30  | 756                     | 3     | 25.8                | 266             | 16,350                    | 40,601    | 360,000   |
| Apr.   | 40.72             | 34.06 | 26  | 3,190                   | 6     | 3.9                 | 576             | 34,173                    | 46,974    | 251,919   |
| May    | 53.31             | 35.07 | 11  | 11,400                  | 1     | 378                 | 6,220           | 382,973                   | 72,006    | 382,973   |
| June   | 55.51             | 34.84 | 30  | 12,800                  | 14    | 30.4                | 7,100           | 421,602                   | 83,892    | 525,330   |
| July   | 55.02             |       | 1   | 12,300                  | 29    | 1,180 0             | 6,220           | 381,320                   | 86,399    | 447,886   |
| Aug.   | 40.62             | 34.55 | 31  | 2,830                   | 21    | 173                 | 611             | 37,659                    | 91,456    | 827,107   |
| Sept.  | 47.44             | 38.06 | 14  | 5,260                   | 5     | 1,860               | 3,710           | 221,224                   | 158,326   | 638,757   |
| Oct.   |                   |       | 18  | 0                       | 7,060 | 23                  | 530             | 3,710                     | 197,488   | 880,859   |
| Nov.   |                   |       | 1   | 0                       | 5,760 | 27                  | 752 0           | 1,740                     | 103,800   | 90,309    |
| Dec.   |                   |       | 27  | 0                       | 1,970 | 4                   | 530 0           | 1,150                     | 70,571    | 80,238    |
| Yearly | 55.51             | 34.06 |     | 12,800                  |       | 3.9                 | 2,680           | 1,941,251                 | 1,053,962 | 2,743,424 |
|        | Meters            |       |     | Cubic Meters per Second |       |                     |                 | Thousands of Cubic Meters |           |           |
|        | 16.92             | 10.38 |     | 362                     |       | 0.11                | 75.9            | 2,394,507                 | 1,300,056 | 3,384,014 |
|        |                   |       |     |                         |       |                     |                 |                           |           | 179,499   |

\*\* Period 1954-1981

\* Discharge measurement made on this day

! And other days

0 Mean daily

**DIVERSIONS FROM THE RIO GRANDE**  
**UNITED STATES SIDE, SAN BENITO TO BROWNSVILLE**

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1981, 90,857 irrigable acres (36,769 ha) and several towns and rural homes were allotted Rio Grande water in the river reach between the gaging stations near San Benito and Brownsville. Such irrigable area was 12.4% of the total irrigable acres (ha) below Falcon Dam allotted Rio Grande water.

The total diversion during 1981 in this river reach was 71,171 acre-feet (87,788,000 m<sup>3</sup>), or 8.2% of the total water diverted from the Rio Grande below Falcon Dam. About 92% of the water diverted in this river reach was determined by the International Boundary and Water Commission through records of discharge obtained by means of flow meters, by open channel rating stations, and by deflection meters developed by the Commission. The records for the rest of these diversions were furnished by the Rio Grande Watermaster and were determined from records of discharge obtained by means of flow meters. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

| Average Flow in Second-Feet (Cubic Meters per Second) |      |            |  |               |  |                  |  |               |  |
|---|------|------------|--|---------------|--|------------------|--|---------------|--|
| Daily:  | Max. | 782 (22.1) |  | June 14, 1963 |  | Min. 0           |  | Occasionally  |  |
| Monthly:  | Max. | 542 (15.3) |  | June 1965     |  | Min. 18.5 (0.52) |  | February 1966 |  |
| Yearly:   | Max. | 223 (6.32) |  | 1965          |  | Min. 98.3 (2.78) |  | 1981          |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.    | Feb. | March   | April | May     | June | July    | Aug. | Sept.   | Oct. | Nov.    | Dec. |
|------------|---------|------|---------|-------|---------|------|---------|------|---------|------|---------|------|
| 1          | 32.6    | 19.3 | 36.1    | 85.6  | 316     | 18.0 | 201     | 132  | 149     | 113  | 46.1    | 97.8 |
| 2          | 52.9    | 20.1 | 49.0    | 151   | 157     | 36.3 | 184     | 86.7 | 102     | 65.4 | 44.9    | 103  |
| 3          | 40.7    | 20.1 | 90.5    | 107   | 133     | 34.6 | 175     | 133  | 121     | 62.1 | 36.8    | 94.9 |
| 4          | 43.7    | 20.1 | 79.6    | 35.6  | 74.4    | 21.0 | 171     | 136  | 39.6    | 60.7 | 36.3    | 95.6 |
| 5          | 78.7    | 20.1 | 63.0    | 22.6  | 46.4    | 19.2 | 162     | 216  | 42.9    | 277  | 26.7    | 72.9 |
| 6          | 111     | 18.7 | 81.7    | 42.3  | 91.1    | 15.5 | 169     | 307  | 40.7    | 358  | 31.1    | 58.1 |
| 7          | 140     | 19.3 | 48.9    | 41.1  | 46.6    | 28.7 | 47.3    | 168  | 40.7    | 238  | 32.4    | 39.9 |
| 8          | 90.1    | 19.3 | 39.7    | 40.7  | 56.3    | 27.2 | 25.7    | 118  | 39.2    | 70.1 | 43.6    | 31.3 |
| 9          | 86.9    | 30.9 | 55.8    | 51.1  | 79.1    | 36.7 | 20.2    | 80.6 | 43.2    | 61.0 | 251     | 49.3 |
| 10         | 43.1    | 26.3 | 41.1    | 54.2  | 88.6    | 29.3 | 52.4    | 112  | 37.6    | 75.8 | 319     | 33.4 |
| 11         | 42.4    | 25.7 | 19.2    | 58.8  | 92.3    | 36.5 | 30.2    | 281  | 48.5    | 102  | 195     | 39.5 |
| 12         | 222     | 27.1 | 17.2    | 32.4  | 79.7    | 35.5 | 25.7    | 256  | 37.8    | 71.8 | 53.1    | 30.2 |
| 13         | 323     | 39.4 | 14.2    | 227   | 93.7    | 41.2 | 34.0    | 252  | 36.5    | 122  | 50.4    | 29.0 |
| 14         | 299     | 32.9 | 15.7    | 339   | 95.8    | 46.3 | 32.0    | 164  | 51.4    | 112  | 29.6    | 49.2 |
| 15         | 184     | 24.7 | 14.2    | 327   | 130     | 42.3 | 21.0    | 101  | 70.6    | 129  | 32.8    | 65.7 |
| 16         | 38.4    | 30.8 | 73.3    | 194   | 186     | 40.0 | 27.9    | 75.0 | 56.0    | 91.1 | 51.0    | 52.2 |
| 17         | 32.8    | 34.0 | 58.2    | 66.8  | 145     | 25.3 | 95.2    | 78.8 | 66.9    | 88.7 | 93.0    | 57.7 |
| 18         | 33.4    | 35.5 | 76.6    | 47.3  | 131     | 37.4 | 41.9    | 134  | 40.9    | 77.7 | 38.9    | 53.2 |
| 19         | 31.8    | 37.5 | 68.4    | 50.8  | 313     | 41.9 | 33.2    | 124  | 39.0    | 60.8 | 45.3    | 40.3 |
| 20         | 16.9    | 36.6 | 79.6    | 302   | 428     | 53.9 | 45.5    | 119  | 40.9    | 270  | 34.2    | 32.3 |
| 21         | 13.8    | 36.4 | 9.9     | 477   | 451     | 57.7 | 64.6    | 125  | 45.3    | 358  | 39.5    | 244  |
| 22         | 13.8    | 30.5 | 10.7    | 501   | 312     | 65.4 | 45.7    | 125  | 47.6    | 261  | 59.8    | 335  |
| 23         | 15.4    | 30.2 | 70.4    | 492   | 191     | 145  | 94.0    | 128  | 65.7    | 96.9 | 272     | 332  |
| 24         | 15.4    | 200  | 41.3    | 270   | 109     | 174  | 116     | 123  | 72.0    | 47.5 | 444     | 31.8 |
| 25         | 18.4    | 318  | 52.3    | 173   | 108     | 133  | 107     | 112  | 50.5    | 31.5 | 227     | 40.8 |
| 26         | 18.4    | 275  | 36.0    | 95.5  | 54.6    | 105  | 66.3    | 116  | 104     | 44.5 | 86.4    | 49.5 |
| 27         | 21.7    | 173  | 40.5    | 212   | 40.9    | 165  | 128     | 135  | 27.5    | 26.2 | 86.0    | 38.3 |
| 28         | 19.3    | 79.6 | 45.0    | 290   | 278     | 121  | 199     | 86.3 | 51.9    | 49.7 | 87.0    | 63.9 |
| 29         | 63.7    | 45.0 | 433     | 164   | 87.8    | 204  | 36.1    | 50.9 | 48.3    | 63.8 | 124     |      |
| 30         | 37.7    | 34.6 | 523     | 20.0  | 189     | 321  | 25.2    | 74.7 | 26.9    | 44.4 | 112     |      |
| 31         | 20.1    | 36.0 | 43.0    | 335   | 13      | 29.0 | 354     | 161  | 75.4    |      |         |      |
| <b>Sum</b> | 1,681.1 |      | 5,742.8 |       | 1,909.7 |      | 4,246.7 |      | 3,572.1 |      | 2,600.8 |      |
|            | 2,201.1 |      | 1,443.7 |       | 4,554.5 |      | 3,293.8 |      | 1,734.5 |      | 2,901.1 |      |

**Current Year 1981**

| Month         | Average Rainfall<br>Inches** |       |     | Extreme Second-Feet     |         | Average<br>Second-<br>Foot | Total<br>Acre-Feet | Period 1957-1981 |         |         |
|---------------|------------------------------|-------|-----|-------------------------|---------|----------------------------|--------------------|------------------|---------|---------|
|               | High                         |       | Low | Average                 | Maximum |                            |                    | Acre-Feet        |         |         |
|               | 1957-1981                    | 1981  | Day | Day                     |         |                            |                    | Average          | Maximum | Minimum |
| Jan.          | 1.76                         | 2.79  | 13  | 323                     | 121     | 13.8                       | 71.0               | 4,366            | 10,296  | 24,568  |
| Feb.          | 1.69                         | .68   | 25  | 318                     | 6       | 18.7                       | 60.0               | 3,334            | 6,888   | 20,626  |
| Mar.          | .71                          | 3.32  | 3   | 90.5                    | 21      | 9.9                        | 46.6               | 2,864            | 6,861   | 15,200  |
| Apr.          | 1.86                         | 1.13  | 30  | 523                     | 5       | 22.6                       | 191                | 11,391           | 11,432  | 27,753  |
| May           | 2.73                         | 7.36  | 21  | 451                     | 30      | 20.0                       | 147                | 9,034            | 14,759  | 28,027  |
| June          | 3.24                         | 2.34  | 30  | 189                     | 6       | 15.5                       | 63.7               | 3,788            | 17,276  | 32,279  |
| July          | 1.95                         | 3.33  | 31  | 354                     | 9       | 20.2                       | 106                | 6,533            | 11,283  | 23,145  |
| Aug.          | 3.28                         | 4.55  | 6   | 307                     | 30      | 25.2                       | 137                | 8,423            | 8,105   | 14,556  |
| Sept.         | 5.57                         | 3.95  | 1   | 149                     | 27      | 27.5                       | 57.8               | 3,440            | 5,725   | 12,600  |
| Oct.          | 3.23                         | 4.49  | 6   | 358                     | 27      | 26.2                       | 115                | 7,085            | 5,854   | 11,300  |
| Nov.          | 1.53                         | .40   | 24  | 444                     | 5       | 26.7                       | 96.7               | 5,754            | 4,741   | 9,021   |
| Dec.          | 1.49                         | .63   | 22  | 335                     | 13      | 29.0                       | 83.9               | 5,159            | 5,649   | 11,200  |
| <b>Yearly</b> | 29.04                        | 34.97 |     | 523                     |         | 9.9                        | 98.3               | 71,171           | 108,869 | 161,503 |
|               | Millimeters                  |       |     | Cubic Meters per Second |         | Thousands of Cubic Meters  |                    |                  |         |         |
|               | 738                          | 888   |     | 14.8                    | 0.28    | 2.78                       | 87,788             | 134,292          | 199,214 | 87,788  |

\*\* United States side - average of several stations in the reach

Ø Mean daily

! And other days

**RIO GRANDE NEAR BROWNSVILLE, TEXAS  
AND MATAMOROS, TAMAULIPAS**

**DESCRIPTION:** Cableway, bubbler gage, and water-stage recorders (graphic and digital) located on the left bank at latitude 25°52'35", longitude 97°27'20", and river mile 48.7 (78.3 km), 0.2 river mile (0.3 km) downstream from El Jardín pumping plant, and 7.0 river miles (11.2 km) downstream from the international highway bridge (Gateway) between Brownsville, Texas and Matamoros, Tamaulipas. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 20 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1934 through 1981.

**REMARKS:** Except for diversions, tributary inflows, and drainage returns below Falcon Dam, flow at this station after August 25, 1953 was controlled largely by releases from Falcon Reservoir, 226.1 miles (363.9 km) upstream. Excessive upstream flood flows are partly diverted into the United States and Mexican floodway systems before reaching this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 31,700 second-feet (898 m<sup>3</sup>/sec) on October 8, 1945 with a gage height of 31.48 feet (9.60 m). Min. no flow occurs frequently.

Average Flow in Second-Feet (Cubic Meters per Second)\*\*

|          |                   |                    |                  |             |
|----------|-------------------|--------------------|------------------|-------------|
| Daily:   | Max. 16,200 (459) | Oct. 19 & 20, 1971 | Min. 0           | Frequently  |
| Monthly: | Max. 14,400 (408) | Oct. 1971          | Min. 3.5 (0.10)  | August 1957 |
| Yearly:  | Max. 3,640 (103)  | 1976               | Min. 42.1 (1.19) | 1956        |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.            | Feb.           | March | April          | May     | June           | July     | Aug.           | Sept.   | Oct.          | Nov.    | Dec.  |       |
|------------|-----------------|----------------|-------|----------------|---------|----------------|----------|----------------|---------|---------------|---------|-------|-------|
| 1          | 204             | 201            | 169   | 235            | 413     | 8,440          | 11,400   | 1,010          | 1,910   | 3,570         | 6,290   | 1,210 |       |
| 2          | 176             | 241            | 206   | 193            | 335     | 8,580          | 11,300   | 763            | 2,130   | 3,370         | 5,720   | 1,200 |       |
| 3          | 165             | 276            | 151   | 134 *          | 445     | 8,190          | 11,300   | 625            | 1,880   | 3,740         | 4,770   | 1,050 |       |
| 4          | 174             | 245            | 189 * | 65.7           | 1,450   | 7,840          | 11,500   | 696 *          | 1,680   | 4,380         | 3,570 * | 840   |       |
| 5          | 211 *           | 239            | 170   | 60.0           | 2,710   | 8,020          | 11,400   | 565            | 1,680   | 4,730 *       | 2,800   | 657   |       |
| 6          | 190             | 287 *          | 99.9  | 57.9           | 4,800   | 8,020          | 11,500   | 441            | 1,710   | 4,100         | 2,420   | 699   |       |
| 7          | 137             | 275            | 90.8  | 54.4           | 5,650 * | 7,950          | 10,900   | 300            | 2,220   | 3,010         | 1,920   | 1,380 |       |
| 8          | 93.6            | 270            | 87.9  | 49.4           | 6,320   | 7,910          | 9,920    | 318            | 2,630   | 2,480         | 1,580   | 1,600 |       |
| 9          | * 82.3          | 265            | 84.8  | 44.5           | 6,640   | 7,520          | 8,650    | 318            | 3,260 * | 2,010         | 1,290   | 1,200 |       |
| 10         | 69.9            | 259            | 120   | 37.4           | 8,090   | 6,500          | 8,480    | 424            | 3,850   | 1,470         | 780     | 957   |       |
| 11         | 65.7            | 200            | 131   | 25.4           | 9,750   | 4,450          | 8,970    | 565            | 4,060   | 1,220         | 717     | 943   |       |
| 12         | 89.7            | 138            | 200   | 24.4           | 9,890   | 2,560 *        | 10,200   | 600            | 4,660   | 1,380         | 999     | 851   |       |
| 13         | 172             | 103            | 336   | 72.0           | 9,990   | 1,560          | 11,300   | 194            | 5,790   | 2,240         | 1,270   | 826   |       |
| 14         | 269             | 99.2           | 319   | 93.6           | 9,390   | 706            | 11,700   | 424            | 6,360   | 2,560         | 1,360   | 833   |       |
| 15         | 347             | 99.6           | 427   | 67.8           | 9,360   | 388            | 11,700   | 353            | 6,070   | 2,750         | 1,450   | 1,090 |       |
| 16         | 456             | 111            | 434   | 47.0           | 8,720   | 999            | 10,700   | 424            | 5,120   | 3,510         | 1,520   | 1,640 |       |
| 17         | 392             | 133 *          | 338   | 10.6           | 8,400   | 2,290          | 8,830    | 491 *          | 3,850   | 4,130         | 1,510   | 1,520 |       |
| 18         | 270             | 138            | 312 * | 54.7           | 8,120   | 4,770          | 4,770    | 501            | 2,800   | 4,380         | 1,330   | 1,080 |       |
| 19         | 260             | 291            | 264   | 145            | 7,700 * | 8,690          | 1,550    | 424            | 2,500   | 3,920         | 1,150   | 724   |       |
| 20         | 301             | 802            | 237   | 312            | 6,600   | 9,710          | 1,240    | 353            | 3,390   | 3,040         | 1,070   | 706   |       |
| 21         | 381             | 1,020          | 210   | 297            | 5,300   | 9,820          | 1,240    | 335            | 4,450 * | 2,080 *       | 1,110   | 837   |       |
| 22         | 327             | 1,120          | 227   | 266            | 4,410   | 9,890          | 1,200    | 318            | 4,660   | 1,320         | 1,230   | 791   |       |
| 23         | 305 *           | 1,410          | 283   | 145            | 4,030   | 10,100         | 1,200    | 318            | 4,450   | 999           | 1,340 * | 816   |       |
| 24         | 301             | 1,220          | 201   | 39.6           | 4,100   | 10,100         | 1,200    | 388            | 4,270   | 932           | 996     | 851   |       |
| 25         | 307             | 745            | 165   | 34.3           | 4,410   | 10,100         | 1,240    | 456            | 4,170   | 2,390         | 770     | 1,110 |       |
| 26         | 295             | 349            | 136   | 1,320          | 4,730   | 10,300         | 1,310    | 470            | 4,200   | 4,480         | 770     | 1,620 |       |
| 27         | 277             | 137            | 121   | 2,130          | 4,980   | 10,600         | 1,240    | 484            | 4,340   | 5,900         | 773     | 1,870 |       |
| 28         | 211             | 105            | 103   | 1,600          | 5,160   | 10,900         | 1,240    | 583            | 4,450   | 6,430         | 770     | 1,730 |       |
| 29         | 149             |                |       | 87.6           | 925     | 4,560          | 11,200 * | 1,200          | 826     | 4,410         | 6,530   | 731   | 1,380 |
| 30         | 185             |                |       | 77.0           | 533     | 4,450          | 11,400   | 1,170          | 985     | 4,060         | 6,570   | 833   | 957   |
| 31         | 190             |                |       | 139            | 8,480   | 1,240          | 1,090    |                |         | 6,500         |         | 745   |       |
| <b>Sum</b> | <b>10,777.8</b> | <b>9,073.7</b> |       | <b>219,503</b> |         | <b>16,342</b>  |          | <b>106,121</b> |         | <b>33,713</b> |         |       |       |
|            | <b>7,053.2</b>  | <b>6,146.0</b> |       | <b>179,383</b> |         | <b>200,790</b> |          | <b>111,010</b> |         | <b>52,839</b> |         |       |       |

**Current Year 1981**

| Month  | Extreme Gage Feet |       |     | Extreme Second-Feet            |     | Average Second-Feet | Total Acre-Feet                  | Period 1954-1981 |           |           |  |  |
|--------|-------------------|-------|-----|--------------------------------|-----|---------------------|----------------------------------|------------------|-----------|-----------|--|--|
|        | High              |       | Low | High                           |     |                     |                                  | Acre-Feet        |           |           |  |  |
|        | High              | Low   |     | Day                            | Day |                     |                                  | Average          | Maximum   | Minimum   |  |  |
| Jan.   | 6.04              | 3.67  | 16  | 470                            | 11  | 61.8                | 227                              | 13,990           | 47,023    | 330,268   |  |  |
| Feb.   | 9.78              | 3.87  | 23  | 1,430                          | 28  | 82.3                | 385                              | 21,375           | 44,451    | 362,000   |  |  |
| Mar.   | 6.10              | 3.54  | 115 | 487                            | 30  | 73.8                | 198                              | 12,191           | 34,963    | 361,000   |  |  |
| Apr.   | 12.20             | 3.28  | 27  | 2,260                          | 25  | 1.8                 | 302                              | 17,995           | 34,307    | 219,590   |  |  |
| May    | 25.52             | 5.12  | 12  | 10,300                         | 3   | 281                 | 5,790                            | 355,795          | 55,797    | 355,795   |  |  |
| June   | 27.20             |       | 30  | 11,500                         | 15  | 388 0               | 7,310                            | 435,339          | 65,202    | 486,551   |  |  |
| July   |                   |       | 114 | 8,117,000                      | 30  | 1,170 0             | 6,460                            | 398,138          | 77,510    | 437,546   |  |  |
| Aug.   | 10.47             |       | 31  | 1,490                          | 7   | 300 0               | 526                              | 32,417           | 81,888    | 112,000   |  |  |
| Sept.  | 20.47             | 10.47 | 14  | 6,430                          | 1   | 1,490               | 3,710                            | 220,223          | 143,707   | 812,033   |  |  |
| Oct.   | 21.33             | 8.40  | 30  | 6,570                          | 24  | 735                 | 3,420                            | 210,507          | 184,967   | 635,722   |  |  |
| Nov.   | 21.19             | 7.28  | 1   | 6,430                          | 11  | 671                 | 1,760                            | 104,816          | 85,577    | 528,000   |  |  |
| Dec.   | 11.09             | 6.56  | 27  | 1,870                          | 1   | 583                 | 1,090                            | 66,837           | 77,800    | 480,000   |  |  |
|        |                   |       |     | 3.28                           |     | 1,117,000           | 1.8                              | 2,610            | 1,889,623 | 933,192   |  |  |
|        |                   |       |     |                                |     |                     |                                  |                  | 2,645,434 | 30,596    |  |  |
| Yearly | <b>Meters</b>     |       |     | <b>Cubic Meters per Second</b> |     |                     | <b>Thousands of Cubic Meters</b> |                  |           |           |  |  |
|        |                   | 1.00  |     | 0                              | 332 | 0.05                | 73.9                             | 2,330,825        | 1,151,093 | 3,263,143 |  |  |
|        |                   |       |     |                                |     |                     |                                  |                  | 37,740    |           |  |  |

\*\* Period 1954-1981

\* Discharge measurement made on this day

! And other days

Ø Mean daily

**DIVERSIONS FROM THE RIO GRANDE**  
**UNITED STATES SIDE, BROWNSVILLE TO THE GULF OF MEXICO**

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1981, 4,665 irrigable acres (1,888 ha) were allotted Rio Grande water in the river reach between the gaging station near Brownsville and the mouth of the Rio Grande. Such irrigable area was 0.6% of the total irrigable acres (ha) below Falcon Dam allotted Rio Grande water.

The total diversion during 1981 in this river reach was 1,490.3 acre-feet (1,837,800 m<sup>3</sup>), or 0.2% of the total water diverted from the Rio Grande below Falcon Dam. All records of diversions in this river reach, which were determined by means of flow meters, were furnished by the Rio Grande Watermaster. More than one crop per year is often grown on parts of this land.

**EXTREME FLOWS FROM RECORDS:**

|          |      |             |               | Average Flow in Second-Feet (Cubic Meters per Second) |  |  |  |  |  |              |  |  |  |  |  |
|----------|------|-------------|---------------|---|--|--|--|--|--|--------------|--|--|--|--|--|
| Daily:   | Max. | 40.4 (1.14) | June 17, 1965 | Min. 0  |  |  |  |  |  | Frequently   |  |  |  |  |  |
| Monthly: | Max. | 23.4 (0.66) | June 1965     | Min. 0  |  |  |  |  |  | Occasionally |  |  |  |  |  |
| Yearly:  | Max. | 7.0 (0.20)  | 1965          | Min. 0.7 (0.02)                                       |  |  |  |  |  | 1976         |  |  |  |  |  |

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan. | Feb.        | March | April        | May  | June     | July | Aug.        | Sept. | Oct.        | Nov. | Dec.         |
|------------|------|-------------|-------|--------------|------|----------|------|-------------|-------|-------------|------|--------------|
| 1          | 0    | 0           | 0     | 2.0          | 20.0 | 0        | 0    | 0           | 0     | 3.1         | 0    | 4.4          |
| 2          | 0    | 0           | 0     | 2.0          | 20.0 | 0        | 0    | 0           | 0     | 3.1         | 0    | 4.4          |
| 3          | 1.0  | 0           | 2.6   | 1.7          | 13.3 | 0        | 0    | 6.6         | 3.4   | 4.7         | 4.4  | 6.2          |
| 4          | 1.0  | 0           | 2.6   | 1.7          | 13.3 | 0        | 0    | 8.8         | 3.4   | 4.7         | 4.4  | 8.0          |
| 5          | 1.0  | 0           | 2.6   | 1.7          | 15.0 | 0        | 0    | 8.8         | 3.4   | 4.7         | 4.4  | 8.0          |
| 6          | 1.0  | 0           | 2.6   | 1.7          | 14.9 | 0        | 0    | 6.6         | 3.4   | 3.7         | 4.4  | 4.7          |
| 7          | 4.2  | 0           | 0     | 0            | 3.3  | 0        | 0    | 0           | 0     | 3.7         | 0    | 4.7          |
| 8          | 4.5  | 0           | 0     | 1.0          | 5.0  | 0        | 0    | 0           | 0     | 3.7         | 0    | 4.7          |
| 9          | 4.5  | 0           | 0     | 1.0          | 1.6  | 0        | 0    | 0           | 0     | 3.7         | 0    | 5.9          |
| 10         | 3.2  | 0           | 0     | 1.0          | 1.6  | 0        | 0    | 0           | 0     | 3.7         | 2.2  | 4.7          |
| 11         | 3.2  | 1.5         | 0     | 1.0          | 8.9  | 0        | 0    | 0           | 0     | 3.7         | 2.2  | 4.7          |
| 12         | 3.2  | 1.5         | 0     | 1.0          | 9.3  | 0        | 0    | 0           | 0     | 3.7         | 0    | 4.7          |
| 13         | 3.2  | 1.5         | 0     | 1.0          | 9.3  | 0        | 0    | 0           | 0     | 2.5         | 0    | 4.7          |
| 14         | 3.2  | 1.5         | 0     | 0            | 9.3  | 0        | 0    | 0           | 0     | 0           | 0    | 4.7          |
| 15         | 0    | 1.5         | 0     | 0            | 6.1  | 0        | 0    | 0           | 0     | 1.9         | 0    | 3.5          |
| 16         | 0    | 1.5         | 0     | 0            | 6.1  | 0        | 0    | 0           | 0     | 1.9         | 0    | 3.5          |
| 17         | 0    | 0           | 0     | 0            | 6.1  | 0        | 0    | 0           | 0     | 1.9         | 0    | 3.5          |
| 18         | 0    | 0           | 0     | 0            | 9.4  | 0        | 0    | 0           | 0     | 0           | 0    | 2.9          |
| 19         | 0    | 0           | 0     | 0            | 4.3  | 0        | 0    | 0           | 0     | 0           | 0    | 2.9          |
| 20         | 0    | 0           | 0     | 5.6          | 3.5  | 0        | 0    | 0           | 0     | 0           | 0    | 2.9          |
| 21         | 0    | 0           | 0     | 10.8         | 3.5  | 0        | 0    | 0           | 2.3   | 0           | 0    | 2.9          |
| 22         | 0    | 0           | 0     | 10.8         | 4.9  | 0        | 0    | 0           | 2.3   | 0           | 0    | 2.9          |
| 23         | 0    | 7.9         | 0     | 10.8         | 4.9  | 0        | 0    | 0           | 2.3   | 0           | 0    | 2.9          |
| 24         | 0    | 7.9         | 0     | 10.8         | 3.4  | 0        | 0    | 0           | 2.3   | 2.7         | 2.1  | 2.9          |
| 25         | 0    | 7.9         | 0     | 10.8         | 3.4  | 0        | 0    | 0           | 0     | 2.7         | 2.1  | 5.3          |
| 26         | 0    | 0           | 0     | 7.3          | 0    | 0        | 0    | 0           | 0     | 2.7         | 0    | 5.3          |
| 27         | 0    | 0           | 0     | 7.3          | 0    | 0        | 0    | 0           | 0     | 2.7         | 0    | 5.3          |
| 28         | 0    | 0           | 0     | 8.5          | 2.8  | 0        | 0    | 0           | 0     | 2.7         | 0    | 5.3          |
| 29         | 1.2  | 0           | 0     | 15.0         | 2.8  | 0        | 0    | 0           | 0     | 2.7         | 0    | 4.4          |
| 30         | 1.2  | 2.0         | 0     | 18.0         | 2.8  | 0        | 0    | 0           | 0     | 2.7         | 0    | 9.5          |
| 31         | 1.2  | 2.0         | 0     | 0            | 0    | 0        | 0    | 0           | 0     | 0           | 0    | 9.2          |
| <b>Sum</b> |      | <b>32.7</b> |       | <b>132.5</b> |      | <b>0</b> |      | <b>40.0</b> |       | <b>62.8</b> |      | <b>136.0</b> |
|            |      | 36.8        |       | 14.4         |      | 208.8    |      | 0           |       | 32.5        |      | 54.2         |

| Current Year 1981 |                              |       |                       | Period 1957-1981        |             |                    |                           |              |                       |
|-------------------|------------------------------|-------|-----------------------|-------------------------|-------------|--------------------|---------------------------|--------------|-----------------------|
| Month             | Average Rainfall<br>Inches** |       | θ Extreme Second-Feet | Average<br>Second-Feet  |             | Total<br>Acre-Feet | Acre-Feet                 |              |                       |
|                   | 1957-1981                    | 1981  | High Day              | Low Day                 | Average Day | Average            | Maximum                   | Minimum      |                       |
| Jan.              | 1.75                         | 2.28  | 1 8                   | 4.5                     | 1 1         | 0                  | 1.2                       | 73.0         | 366 1,275 0           |
| Feb.              | 1.78                         | .77   | 123                   | 7.9                     | 1 1         | 0                  | 1.2                       | 64.9         | 199 668 0             |
| Mar.              | .67                          | 2.71  | 1 3                   | 2.6                     | 1 1         | 0                  | .5                        | 28.6         | 129 634 0             |
| Apr.              | 1.95                         | 1.01  | 30                    | 18.0                    | 1 7         | 0                  | 4.4                       | 263          | 222 953 0             |
| May               | 2.53                         | 4.91  | 1 1                   | 20.0                    | 1 26        | 0                  | 6.7                       | 414          | 362 1,356 0           |
| June              | 3.01                         | 2.80  | 0                     | 0                       | 0           | 0                  | 0                         | 0            | 445 1,393 0           |
| July              | 1.89                         | 4.75  | 0                     | 0                       | 0           | 0                  | 0                         | 0            | 184 778 0             |
| Aug.              | 3.21                         | 4.95  | 1 4                   | 8.8                     | 1 1         | 0                  | 1.3                       | 79.3         | 114 317 13.7          |
| Sept.             | 5.62                         | 3.88  | 1 3                   | 3.4                     | 1 1         | 0                  | 1.1                       | 64.5         | 51.1 190 0            |
| Oct.              | 3.05                         | 2.02  | 1 3                   | 4.7                     | 1 14        | 0                  | 2.0                       | 125          | 64.4 218 0            |
| Nov.              | 1.56                         | .35   | 125                   | 5.3                     | 1 1         | 0                  | 1.8                       | 108          | 66.5 252 0            |
| Dec.              | 1.57                         | .41   | 30                    | 9.5                     | 25          | 0                  | 4.4                       | 270          | 335 335 0             |
|                   | 28.59                        | 30.84 |                       | 20.0                    |             | 0                  | 2.1                       | 1,490.3      | 2,285.9 5,036.3 543.2 |
| Yearly            | Millimeters                  |       |                       | Cubic Meters per Second |             |                    | Thousands of Cubic Meters |              |                       |
|                   | 726                          | 783   |                       | 0.57                    |             | 0                  | 0.06                      | 1,837.8      | 2,819.5 6,212 670     |
|                   |                              |       |                       |                         |             |                    |                           | θ Mean daily | ! And other days      |

\*\* United States side - average of several stations in the reach

## DIVERSIONS FROM THE RIO GRANDE UNITED STATES SIDE, FALCON DAM TO THE GULF OF MEXICO

Beginning June 1971, the Texas Water Rights Commission, now the Texas Department of Water Resources, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

In 1981, 731,234 irrigable acres (295,923 ha), several towns, and many rural homes were allotted Rio Grande water between Falcon Dam and the Gulf of Mexico. The total diversion from the river was 864,598 acre-feet (1,066,482,000 m<sup>3</sup>). About 93% of the water diverted was determined through records of discharge obtained by means of flow meters, by open channel rating stations, and by deflection meters developed by the Commission. The records for the balance of the diversions were furnished by the Rio Grande Watermaster and were determined from records of discharge obtained by means of flow meters. Drainage from more than 90% of this area does not return to the Rio Grande, but some of it is reused within the area. More than one crop per year is often grown on parts of this land.

Division data pertaining to "Diversions from the Rio Grande—United States Side below Rio Grande City" for the period 1922 through 1957 may be found in previous issues of these Water Bulletins. The area irrigated below Rio Grande City is about 99% of the total acreage irrigated on the United States side below Falcon Dam.

A breakdown by river reaches of the total diversion below Falcon Dam shown in the tabulation below may be found in appropriate downstream order in preceding pages of this Water Bulletin. Because the mean daily discharges are rounded, the total acre-feet shown in the summary below may not equal the sum of the acre-feet of the individual reaches.

## EXTREME FLOWS FROM RECORDS:

|          | Average Flow in Second-Feet (Cubic Meters per Second) |                    |  |                 |  |  |               |  |  |  |
|----------|---|--------------------|--|-----------------|--|--|---------------|--|--|--|
| Daily:   | Max. 5,380 (152)                                      | June 20 & 21, 1960 |  | Min. 3.5 (0.10) |  |  | Oct. 31, 1976 |  |  |  |
| Monthly: | Max. 4,350 (123)                                      | June 1960          |  | Min. 102 (2.89) |  |  | March 1957    |  |  |  |
| Yearly:  | Max. 1,750 (49.6)                                     | 1980               |  | Min. 880 (24.9) |  |  | 1970          |  |  |  |
|          |   |                    |  |                 |  |  |               |  |  |  |

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day | Jan.   | Feb.  | March  | April | May    | June  | July     | Aug.  | Sept.  | Oct.  | Nov.   | Dec.  |
|-----|--------|-------|--------|-------|--------|-------|----------|-------|--------|-------|--------|-------|
| 1   | 566    | 126   | 462    | 1,670 | 894    | 808   | 1,440    | 2,670 | 505    | 1,870 | 278    | 1,420 |
| 2   | 632    | 238   | 746    | 1,920 | 564    | 1,060 | 1,230    | 2,430 | 573    | 1,520 | 410    | 1,680 |
| 3   | 475    | 283   | 1,180  | 1,820 | 242    | 847   | 1,260    | 3,050 | 602    | 970   | 512    | 1,630 |
| 4   | 383    | 314   | 1,240  | 1,550 | 239    | 701   | 823      | 3,010 | 717    | 972   | 597    | 1,590 |
| 5   | 880    | 254   | 1,360  | 1,390 | 156    | 657   | 727      | 3,170 | 440    | 1,760 | 853    | 1,480 |
| 6   | 1,110  | 230   | 1,250  | 2,190 | 401    | 567   | 703      | 3,050 | 198    | 1,970 | 1,020  | 870   |
| 7   | 1,310  | 242   | 1,090  | 2,340 | 325    | 426   | 421      | 2,810 | 561    | 1,990 | 739    | 1,400 |
| 8   | 1,420  | 132   | 980    | 2,510 | 384    | 802   | 196      | 2,570 | 679    | 1,470 | 500    | 1,730 |
| 9   | 1,410  | 473   | 1,290  | 2,660 | 129    | 1,260 | 296      | 2,390 | 757    | 1,410 | 905    | 1,690 |
| 10  | 1,010  | 532   | 1,150  | 2,730 | 121    | 1,640 | 573      | 2,760 | 786    | 1,120 | 1,030  | 1,610 |
| 11  | 811    | 641   | 679    | 2,440 | 290    | 1,730 | 518      | 2,930 | 814    | 1,070 | 1,230  | 1,350 |
| 12  | 1,340  | 598   | 509    | 2,330 | 425    | 1,850 | 178      | 2,930 | 558    | 1,560 | 1,130  | 1,020 |
| 13  | 1,300  | 520   | 325    | 3,310 | 262    | 1,500 | 486      | 2,730 | 472    | 1,740 | 1,080  | 995   |
| 14  | 1,300  | 398   | 123    | 3,350 | 327    | 1,190 | 410      | 2,340 | 1,110  | 1,880 | 636    | 1,420 |
| 15  | 957    | 345   | 110    | 3,310 | 474    | 1,420 | 721      | 1,920 | 1,430  | 1,950 | 399    | 1,270 |
| 16  | 582    | 360   | 236    | 3,170 | 442    | 1,280 | 916      | 1,530 | 1,540  | 2,040 | 1,010  | 1,370 |
| 17  | 393    | 361   | 239    | 2,860 | 293    | 1,380 | 1,190    | 2,290 | 1,530  | 1,790 | 1,260  | 1,450 |
| 18  | 352    | 423   | 280    | 2,450 | 682    | 1,680 | 772      | 2,330 | 1,310  | 1,480 | 1,270  | 1,410 |
| 19  | 250    | 434   | 305    | 2,180 | 1,320  | 1,840 | 692      | 2,380 | 812    | 1,460 | 1,110  | 1,100 |
| 20  | 183    | 508   | 444    | 3,200 | 1,700  | 1,710 | 1,110    | 2,280 | 670    | 1,730 | 1,020  | 963   |
| 21  | 212    | 505   | 261    | 3,620 | 1,940  | 1,610 | 1,620    | 2,070 | 1,490  | 1,840 | 614    | 1,560 |
| 22  | 217    | 211   | 263    | 3,870 | 1,810  | 1,850 | 1,700    | 1,820 | 1,850  | 1,620 | 482    | 1,690 |
| 23  | 229    | 472   | 691    | 3,660 | 1,300  | 2,150 | 1,970    | 1,520 | 2,040  | 916   | 1,400  | 1,670 |
| 24  | 181    | 976   | 848    | 2,840 | 947    | 2,200 | 2,020    | 1,740 | 2,360  | 398   | 1,860  | 630   |
| 25  | 155    | 1,260 | 1,020  | 1,680 | 880    | 1,850 | 1,760    | 1,580 | 2,430  | 219   | 1,600  | 128   |
| Sum | 13,202 |       | 69,272 |       | 40,073 |       | 64,166.1 |       | 40,282 |       | 41,522 |       |
|     | 19,998 |       | 23,722 |       | 21,350 |       | 37,482   |       | 37,414 |       | 27,418 |       |

| Current Year 1981 |                              |       |                         |       |     |                            | Period 1957-1981 |           |           |           |         |
|-------------------|------------------------------|-------|-------------------------|-------|-----|----------------------------|------------------|-----------|-----------|-----------|---------|
| Month             | Average Rainfall<br>Inches** |       | Extreme Second-Feet     |       |     | Average<br>Second-<br>Foot | Acre-Feet        |           |           |           |         |
|                   | 1957-1981                    | 1981  | Day                     | High  | Low |                            | Average          | Maximum   | Minimum   |           |         |
| Jan.              | 1.45                         | 2.99  | 8                       | 1,420 | 25  | 155                        | 645              | 39,665    | 71,338    | 182,403   | 9,717   |
| Feb.              | 1.28                         | 1.09  | 25                      | 1,260 | 1   | 126                        | 472              | 26,186    | 49,928    | 126,230   | 11,785  |
| Mar.              | .70                          | 2.83  | 31                      | 1,510 | 15  | 110                        | 765              | 47,052    | 72,171    | 149,000   | 6,280   |
| Apr.              | 1.61                         | 2.44  | 22                      | 3,870 | 27  | 720                        | 2,310            | 137,399   | 103,117   | 209,970   | 25,100  |
| May               | 2.54                         | 6.04  | 21                      | 1,940 | 10  | 121                        | 689              | 42,347    | 112,220   | 228,833   | 16,071  |
| June              | 2.94                         | 4.70  | 24                      | 2,200 | 7   | 426                        | 1,340            | 79,484    | 138,854   | 259,000   | 31,931  |
| July              | 1.66                         | 2.56  | 31                      | 3,020 | 12  | 178                        | 1,210            | 74,344    | 98,800    | 196,205   | 31,502  |
| Aug.              | 2.74                         | 4.57  | 5                       | 3,170 | 30  | 87.1                       | 2,070            | 127,272   | 77,142    | 143,286   | 36,208  |
| Sept.             | 4.63                         | 1.62  | 29                      | 2,500 | 6   | 198                        | 1,250            | 74,210    | 55,044    | 136,000   | 12,709  |
| Oct.              | 2.86                         | 3.81  | 16                      | 2,040 | 25  | 219                        | 1,300            | 79,808    | 61,010    | 124,598   | 12,991  |
| Nov.              | 1.24                         | .20   | 24                      | 1,860 | 1   | 278                        | 914              | 54,383    | 48,814    | 97,969    | 12,674  |
| Dec.              | 1.10                         | .30   | 29                      | 1,990 | 25  | 128                        | 1,340            | 82,358    | 49,147    | 84,500    | 14,034  |
|                   | 24.75                        | 33.15 |                         | 3,870 |     | 87.1                       | 1,190            | 864,598   | 937,585   | 1,267,999 | 636,835 |
| Yearly            | Millimeters                  |       | Cubic Meters per Second |       |     | Thousands of Cubic Meters  |                  |           |           |           |         |
|                   | 629                          | 842   |                         | 110   |     | 2.47                       | 33.8             | 1,066,482 | 1,156,511 | 1,562,843 | 785,536 |

\*\* United States side - average of several stations in the reach

θ Mean daily

**OUTFALLS FROM SEWERS INTO THE RIO GRANDE**  
**In Acre-Feet**

**EL PASO SEWAGE OUTFALL**

Treated sewage effluent enters the Rio Grande through the outfall of the Haskell Street Wastewater Treatment Plant located 7.1 river miles downstream from the American Dam. The outfall from this plant consists of flows measured by a Sparling propeller outfall meter and estimates of amounts which bypass the meter. The effluent from the Socorro Treatment Plant, located 17.6 miles below the American Dam, after treatment in oxidation ponds is discharged to the Riverside Canal to be used for irrigation. This effluent is also measured by a Sparling propeller outfall meter, does not enter the Rio Grande, and is not included in the table below. Both plants are operated by the El Paso Water Utilities of the Public Service Board of the City of El Paso, Texas, and the records are furnished by that agency.

| Month     | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  | Yearly |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 1981      | 2,050 | 1,739 | 2,033 | 2,030 | 2,206 | 2,247 | 2,409 | 2,416 | 2,366 | 2,243 | 2,195 | 2,275 | 26,209 |
| * Average | 1,927 | 1,824 | 1,940 | 1,960 | 2,086 | 2,050 | 2,206 | 2,177 | 2,101 | 2,026 | 1,915 | 1,938 | 24,150 |

**EAGLE PASS SEWAGE OUTFALL**

This sewage outfall enters the Rio Grande at river mile 495.8 and about 600 feet upstream from the Eagle Pass-Piedras Negras International Railroad Bridge. The records are based on weekly current meter measurements and estimates by personnel of the International Boundary and Water Commission.

| Month     | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Yearly |
|-----------|------|------|------|------|-----|------|------|------|-------|------|------|------|--------|
| 1981      | 175  | 152  | 155  | 169  | 155 | 165  | 212  | 190  | 187   | 213  | 126  | 170  | 2,069  |
| * Average | 120  | 108  | 128  | 113  | 126 | 133  | 142  | 152  | 140   | 148  | 137  | 135  | 1,582  |

**LAREDO SEWAGE OUTFALL**

This sewage outfall enters the Rio Grande at river mile 360.0 and immediately upstream from the Nuevo Laredo Gaging Station. The record is furnished by Laredo Waterworks System.

| Month     | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct.  | Nov. | Dec. | Yearly |
|-----------|------|------|------|------|-----|------|------|------|-------|-------|------|------|--------|
| 1981      | 788  | 691  | 804  | 821  | 962 | 947  | 998  | 995  | 1,009 | 1,001 | 881  | 865  | 10,762 |
| * Average | 632  | 552  | 626  | 633  | 701 | 676  | 712  | 716  | 702   | 686   | 676  | 669  | 7,981  |

**NUEVO LAREDO SEWAGE OUTFALL**

This sewage outfall enters the Rio Grande at river mile 358.7 and 357.7, 2.2 and 3.2 miles downstream from the old international highway bridge between Laredo, Texas and Nuevo Laredo, Tamaulipas. The records are computed by the International Boundary and Water Commission based on current meter measurements, the weir discharge table, and a continuous record of gage heights.

| Month     | Jan. | Feb. | Mar. | Apr. | May   | June | July | Aug. | Sept. | Oct.  | Nov. | Dec.  | Yearly |
|-----------|------|------|------|------|-------|------|------|------|-------|-------|------|-------|--------|
| 1981      | 921  | 766  | 923  | 932  | 1,018 | 687  | 666  | 730  | 754   | 946   | 816  | 876   | 10,035 |
| # Average | 975  | 857  | 884  | 816  | 968   | 814  | 826  | 822  | 847   | 1,002 | 968  | 1,023 | 10,802 |

**BROWNSVILLE SEWAGE OUTFALL**

This sewage outfall enters the Rio Grande at river mile 52.2, 3.5 river miles downstream from the Gateway Bridge between Brownsville, Texas and Matamoros, Tamaulipas and 3.5 river miles upstream from the Brownsville Gaging Station. Records are furnished by the city of Brownsville.

| Month     | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Yearly |
|-----------|------|------|------|------|-----|------|------|------|-------|------|------|------|--------|
| 1981      | 809  | 685  | 821  | 708  | 787 | 780  | 819  | 821  | 744   | 748  | 714  | 685  | 9,121  |
| * Average | 739  | 675  | 719  | 686  | 738 | 729  | 758  | 750  | 751   | 760  | 690  | 690  | 8,685  |

\* Period averages are for past 10 years

# Period 1976-1981

## MUNICIPAL AND INDUSTRIAL WATER USES In Acre-Feet

Tabulated below are monthly and yearly amounts of water pumped from the Rio Grande directly into municipal distribution systems of cities along the border, except for the city of Del Rio, whose main supply is derived from San Felipe Springs; and the city of El Paso, whose supply is derived mainly from deep wells. The amount shown below for the city of El Paso is Rio Grande water pumped from the Franklin Canal at the El Paso Water Plant for municipal use. Ciudad Acuna, Coahuila, whose municipal diversion from the Rio Grande started in 1971, may at times use an alternate source from Arroyo Las Vacas, which was its previous source of supply. Such use would be reflected in the tabulations below.

All Rio Grande water used by U. S. municipalities below Falcon Dam is also included in the figures shown under "Diversions from the Rio Grande - United States Side..." (by river reaches and total below Falcon Dam) on pages 65, 68, 72, 73, 75, 77, and 78 herein. Population data for all cities are estimates based on the 1980 official census except for Falcon Village (estimated by the International Boundary and Water Commission); and Del Mar and San Ignacio, which are based on utilities connections.

### In the United States

| Month  | EL PASO (Pop. 440,000) |                  |         | DEL RIO Ø (Pop. 36,500) |                  |         |
|--------|------------------------|------------------|---------|-------------------------|------------------|---------|
|        | 1981                   | Period 1972-1981 |         | 1981                    | Period 1972-1981 |         |
|        |                        | Average          | Maximum |                         | Average          | Maximum |
| Jan.   | 337                    | 50.6             | 337     | 0                       | 525.6            | 437.9   |
| Feb.   | 477                    | 83.8             | 477     | 0                       | 517.7            | 465.2   |
| Mar.   | 910                    | 381.8            | 1,256   | 0                       | 657.6            | 651.6   |
| Apr.   | 2,317                  | 1,110.4          | 2,317   | 0                       | 687.9            | 659.7   |
| May    | 3,703                  | 2,392.1          | 3,703   | 0                       | 750.2            | 640.8   |
| June   | 3,776                  | 3,047.9          | 4,084   | 1,596                   | 753.9            | 848.3   |
| July   | 3,594                  | 2,854.5          | 3,728   | 1,982                   | 1,103.1          | 983.3   |
| Aug.   | 3,174                  | 2,950.3          | 3,850   | 1,748                   | 1,077.6          | 941.8   |
| Sept.  | 2,044                  | 1,864.3          | 2,709   | 863                     | 911.3            | 740.3   |
| Oct.   | 1,159                  | 298.2            | 1,159   | 0                       | 623.0            | 596.7   |
| Nov.   | 400                    | 92.4             | 400     | 0                       | 608.2            | 842.6   |
| Dec.   | 0                      | 49.0             | 329     | 0                       | 584.5            | 442.1   |
| Yearly | 21,891                 | 15,174.6         | 21,891  | 7,229                   | 8,800.6          | 7,864.4 |
|        |                        |                  |         |                         | 11,098.9         | 6,675.1 |

| Month  | EAGLE PASS (Pop. 22,000) |                  |         | DEL MAR (Pop. 4,690) |                  |         |
|--------|--------------------------|------------------|---------|----------------------|------------------|---------|
|        | 1981                     | Period 1972-1981 |         | 1981                 | Period 1972-1981 |         |
|        |                          | Average          | Maximum |                      | Average          | Maximum |
| Jan.   | 274.8                    | 251.3            | 305.1   | 190.7                | 50.3             | 35.4    |
| Feb.   | 248.2                    | 241.5            | 331.9   | 188.2                | 47.3             | 37.5    |
| Mar.   | 296.7                    | 301.4            | 394.9   | 217.0                | 68.7             | 54.1    |
| Apr.   | 291.1                    | 294.9            | 407.7   | 200.4                | 73.0             | 57.3    |
| May    | 308.4                    | 318.0            | 400.1   | 270.5                | 75.4             | 61.7    |
| June   | 340.2                    | 366.9            | 433.0   | 294.3                | 80.2             | 69.9    |
| July   | 554.7                    | 444.0            | 582.1   | 281.9                | 95.8             | 73.8    |
| Aug.   | 490.2                    | 427.7            | 564.3   | 305.1                | 117.2            | 69.0    |
| Sept.  | 415.5                    | 352.7            | 544.5   | 228.3                | 97.3             | 57.8    |
| Oct.   | 361.4                    | 326.7            | 506.9   | 191.4                | 77.2             | 51.7    |
| Nov.   | 329.8                    | 261.8            | 345.1   | 187.8                | 85.9             | 46.4    |
| Dec.   | 296.8                    | 246.8            | 296.8   | 172.0                | 82.2             | 40.6    |
| Yearly | 4,207.8                  | 3,833.7          | 4,611.0 | 3,162.6              | 950.5            | 655.2   |
|        |                          |                  |         |                      | 1,056.2          | 399.3   |

| Month  | LAREDO (Pop. 94,000) |                  |          | LAREDO POWER STATION |                  |         |
|--------|----------------------|------------------|----------|----------------------|------------------|---------|
|        | 1981                 | Period 1972-1981 |          | 1981                 | Period 1972-1981 |         |
|        |                      | Average          | Maximum  |                      | Average          | Maximum |
| Jan.   | 1,427.6              | 1,129.2          | 1,428.0  | 866.8                | 50.5             | 69.2    |
| Feb.   | 1,284.5              | 1,085.6          | 1,421.4  | 831.8                | 74.3             | 74.7    |
| Mar.   | 1,540.3              | 1,366.9          | 1,899.8  | 1,087.5              | 87.7             | 85.9    |
| Apr.   | 1,572.5              | 1,433.1          | 2,016.6  | 1,015.9              | 101.5            | 89.8    |
| May    | 1,809.2              | 1,563.6          | 1,860.7  | 1,058.8              | 73.4             | 104.0   |
| June   | 1,761.4              | 1,717.6          | 2,378.8  | 1,289.3              | 144.0            | 114.4   |
| July   | 2,018.8              | 1,917.4          | 2,693.6  | 1,434.1              | 151.4            | 126.6   |
| Aug.   | 2,169.9              | 1,861.2          | 2,294.7  | 1,382.3              | 165.4            | 128.0   |
| Sept.  | 1,882.7              | 1,551.1          | 2,045.1  | 1,162.4              | 147.8            | 103.0   |
| Oct.   | 1,691.5              | 1,486.6          | 2,048.5  | 1,156.5              | 117.8            | 94.9    |
| Nov.   | 1,617.7              | 1,278.6          | 1,657.1  | 931.7                | 101.2            | 76.3    |
| Dec.   | 1,540.6              | 1,200.1          | 1,540.6  | 877.0                | 96.5             | 71.0    |
| Yearly | 20,316.7             | 17,591.0         | 22,595.6 | 14,515.1             | 1,311.5          | 1,137.8 |
|        |                      |                  |          |                      | 1,686.2          | 843.2   |

Ø Includes Laughlin Air Force Base

**MUNICIPAL AND INDUSTRIAL WATER USES**

In Acre-Feet

**In the United States**

| Month  | SAN YGNACIO (Pop. 877) |                  |         | NEW ZAPATA (Pop. 5,910) |                  |         |
|--------|------------------------|------------------|---------|-------------------------|------------------|---------|
|        | 1981                   | Period 1972-1981 |         | 1981                    | Period 1972-1981 |         |
|        |                        | Average          | Maximum |                         | Average          | Maximum |
| Jan.   | 4.0                    | 3.4              | 4.8     | 2.2                     | 58.3             | 42.5    |
| Feb.   | 4.1                    | 3.6              | 4.4     | 1.9                     | 53.9             | 53.9    |
| Mar.   | 4.9                    | 4.3              | 5.2     | 3.2                     | 68.8             | 43.2    |
| Apr.   | 4.8                    | 5.0              | 6.6     | 3.0                     | 74.0             | 56.6    |
| May    | 4.7                    | 5.1              | 7.8     | 2.6                     | 78.4             | 58.5    |
| June   | 7.8                    | 5.8              | 9.5     | 2.9                     | 73.1             | 62.2    |
| July   | 8.3                    | 5.9              | 8.9     | 3.2                     | 88.3             | 65.6    |
| Aug.   | 9.0                    | 6.2              | 9.0     | 3.2                     | 93.3             | 72.0    |
| Sept.  | 10.2                   | 5.5              | 10.2    | 3.0                     | 88.1             | 71.2    |
| Oct.   | 7.8                    | 4.7              | 7.8     | 2.6                     | 83.8             | 56.8    |
| Nov.   | 8.6                    | 4.2              | 8.6     | 2.3                     | 83.0             | 54.6    |
| Dec.   | 7.6                    | 3.8              | 7.6     | 2.2                     | 71.2             | 49.6    |
| Yearly | 81.8                   | 57.5             | 81.8    | 35.3                    | 914.2            | 677.5   |
|        |                        |                  |         |                         | 952.8            | 440.7   |

| Month  | FALCON VILLAGE (Pop. 154) |                  |         | ROMA * (Pop. 3,590) |                  |         |
|--------|---------------------------|------------------|---------|---------------------|------------------|---------|
|        | 1981                      | Period 1972-1981 |         | 1981                | Period 1972-1981 |         |
|        |                           | Average          | Maximum |                     | Average          | Maximum |
| Jan.   | 8.9                       | 8.7              | 9.9     | 7.6                 | 57.0             | 43.8    |
| Feb.   | 8.6                       | 8.4              | 9.9     | 7.2                 | 52.5             | 49.4    |
| Mar.   | 9.4                       | 10.3             | 11.5    | 8.4                 | 68.7             | 53.0    |
| Apr.   | 9.8                       | 10.9             | 13.8    | 8.9                 | 71.9             | 58.0    |
| May    | 10.5                      | 10.8             | 12.3    | 8.4                 | 76.5             | 60.7    |
| June   | 9.6                       | 10.7             | 17.6    | 6.6                 | 71.7             | 63.7    |
| July   | 8.9                       | 12.4             | 18.0    | 8.9                 | 81.4             | 65.4    |
| Aug.   | 12.0                      | 12.2             | 14.5    | 10.1                | 98.5             | 98.5    |
| Sept.  | 10.4                      | 9.8              | 13.0    | 7.0                 | 91.0             | 58.3    |
| Oct.   | 9.9                       | 9.9              | 11.6    | 7.3                 | 88.2             | 54.2    |
| Nov.   | 10.5                      | 8.9              | 10.5    | 6.6                 | 75.4             | 53.9    |
| Dec.   | 10.7                      | 9.6              | 11.6    | 7.6                 | 74.6             | 49.1    |
| Yearly | 119.2                     | 122.6            | 146.9   | 110.8               | 907.4            | 675.1   |
|        |                           |                  |         |                     | 930.2            | 484.6   |

| Month  | RIO GRANDE CITY (Pop. 6,500) |                  |         | BROWNSVILLE (Pop. 88,000) |                  |          |
|--------|------------------------------|------------------|---------|---------------------------|------------------|----------|
|        | 1981                         | Period 1972-1981 |         | 1981                      | Period 1972-1981 |          |
|        |                              | Average          | Maximum |                           | Average          | Maximum  |
| Jan.   | 123.9                        | 110.7            | 149.5   | 72.7                      | 1,345.3          | 1,101.0  |
| Feb.   | 131.7                        | 104.4            | 133.1   | 61.9                      | 1,212.2          | 1,049.8  |
| Mar.   | 155.3                        | 126.8            | 177.4   | 72.7                      | 1,404.1          | 1,212.2  |
| Apr.   | 157.3                        | 130.9            | 180.1   | 74.6                      | 1,511.3          | 1,248.6  |
| May    | 163.0                        | 132.4            | 177.6   | 70.2                      | 1,577.8          | 1,377.1  |
| June   | 159.3                        | 143.8            | 233.7   | 60.2                      | 1,503.3          | 1,708.5  |
| July   | 189.4                        | 165.0            | 235.0   | 100.0                     | 1,672.8          | 1,560.7  |
| Aug.   | 209.6                        | 156.0            | 209.6   | 48.4                      | 1,816.4          | 1,552.6  |
| Sept.  | 180.7                        | 140.8            | 221.6   | 93.8                      | 1,985.1          | 1,308.0  |
| Oct.   | 162.8                        | 135.8            | 178.8   | 89.0                      | 1,618.3          | 1,351.3  |
| Nov.   | 148.9                        | 123.4            | 181.4   | 80.7                      | 1,503.4          | 1,230.2  |
| Dec.   | 159.2                        | 120.4            | 159.2   | 80.0                      | 1,340.9          | 1,176.8  |
| Yearly | 1,941.1                      | 1,590.4          | 2,121.0 | 1,039.4                   | 17,990.9         | 15,653.8 |
|        |                              |                  |         |                           | 18,935.7         | 12,115.5 |

\* Includes Los Saenz and Escobares, Texas

**MUNICIPAL AND INDUSTRIAL WATER USES****In Acre-Feet****In Mexico**

| Month         | CD. ACUNA, COAHUILA<br>(Pop. 41,583) |                |                |              | PIEDRAS NEGRAS, COAHUILA<br>(Pop. 74,900) |                |                |                |
|---------------|--------------------------------------|----------------|----------------|--------------|---|----------------|----------------|----------------|
|               | Period 1972-1981                     |                |                | 1981         | Period 1972-1981                          |                |                |                |
|               | Average                              | Maximum        | Minimum        |              | Average                                   | Maximum        | Minimum        |                |
| Jan.          | 222.1                                | 127.0          | 222.1          | 0            | 385.3                                     | 361.3          | 457.1          | 273.0          |
| Feb.          | 198.8                                | 132.5          | 218.2          | 38.0         | 357.9                                     | 314.0          | 406.0          | 215.2          |
| Mar.          | 222.3                                | 159.0          | 226.3          | 76.8         | 458.3                                     | 374.6          | 491.0          | 260.6          |
| Apr.          | 214.9                                | 151.5          | 216.8          | 67.9         | 405.8                                     | 360.9          | 444.1          | 289.4          |
| May           | 221.9                                | 157.1          | 225.0          | 77.6         | 359.1                                     | 388.2          | 472.2          | 294.3          |
| June          | 214.8                                | 165.6          | 238.3          | 83.7         | 324.0                                     | 390.9          | 459.7          | 312.9          |
| July          | 221.2                                | 180.4          | 278.0          | 80.1         | 346.6                                     | 414.3          | 523.9          | 346.6          |
| Aug.          | 222.9                                | 190.1          | 279.0          | 83.7         | 348.0                                     | 410.1          | 462.8          | 319.0          |
| Sept.         | 215.8                                | 173.1          | 270.0          | 81.9         | 321.3                                     | 379.0          | 454.2          | 308.4          |
| Oct.          | 222.1                                | 163.5          | 225.4          | 68.3         | 370.7                                     | 380.0          | 448.9          | 280.0          |
| Nov.          | 215.2                                | 148.2          | 219.1          | 62.7         | 352.9                                     | 339.4          | 421.3          | 286.4          |
| Dec.          | 222.8                                | 142.7          | 223.8          | 61.4         | 361.3                                     | 343.8          | 429.8          | 297.5          |
| <b>Yearly</b> | <b>2,614.8</b>                       | <b>1,890.7</b> | <b>2,662.4</b> | <b>828.8</b> | <b>4,391.2</b>                            | <b>4,456.5</b> | <b>5,157.7</b> | <b>3,602.9</b> |

| Month         | NUEVO LAREDO, TAMPS.<br>(Pop. 235,000) |                 |                 |                 | NUEVA CD. GUERRERO, TAMPS.<br>(Pop. 3,981) |              |              |              |
|---------------|--|-----------------|-----------------|-----------------|--|--------------|--------------|--------------|
|               | Period 1972-1981                       |                 |                 | 1981            | Period 1972-1981                           |              |              |              |
|               | Average                                | Maximum         | Minimum         |                 | Average                                    | Maximum      | Minimum      |              |
| Jan.          | 1,987.8                                | 1,737.4         | 2,146.3         | 1,461.7         | 59.3                                       | 37.0         | 59.3         | 25.1         |
| Feb.          | 1,857.3                                | 1,611.1         | 1,937.3         | 1,390.0         | 48.4                                       | 35.1         | 50.2         | 22.0         |
| Mar.          | 2,098.8                                | 1,898.1         | 2,278.8         | 1,607.2         | 37.8                                       | 38.4         | 54.3         | 26.0         |
| Apr.          | 2,091.8                                | 1,882.9         | 2,141.0         | 1,627.4         | 56.8                                       | 40.2         | 61.0         | 23.3         |
| May           | 2,218.1                                | 2,061.4         | 2,680.9         | 1,574.1         | 57.7                                       | 41.1         | 60.3         | 23.3         |
| June          | 2,310.1                                | 2,111.1         | 2,472.7         | 1,623.9         | 50.3                                       | 40.5         | 60.1         | 25.6         |
| July          | 2,334.0                                | 2,250.1         | 2,750.6         | 1,828.6         | 40.5                                       | 41.1         | 59.0         | 25.1         |
| Aug.          | 2,512.7                                | 2,301.5         | 2,797.8         | 1,818.3         | 42.2                                       | 40.6         | 53.2         | 19.3         |
| Sept.         | 2,180.2                                | 2,097.3         | 2,566.4         | 1,856.0         | 34.3                                       | 34.6         | 49.2         | 15.7         |
| Oct.          | 2,334.4                                | 2,126.5         | 2,591.6         | 1,775.0         | 38.8                                       | 38.8         | 54.8         | 20.5         |
| Nov.          | 2,292.4                                | 2,014.0         | 2,506.2         | 1,689.8         | 35.8                                       | 36.8         | 56.7         | 20.9         |
| Dec.          | 2,029.0                                | 1,869.8         | 2,156.2         | 1,484.5         | 36.1                                       | 34.5         | 58.5         | 20.5         |
| <b>Yearly</b> | <b>26,277.5</b>                        | <b>23,961.2</b> | <b>28,668.7</b> | <b>20,342.6</b> | <b>538.0</b>                               | <b>458.7</b> | <b>616.8</b> | <b>282.8</b> |

| Month         | CD. MIER, TAMPS.<br>(Pop. 5,850) |              |              |              | CD. MIGUEL ALEMAN, TAMPS.<br>(Pop. 14,100) |              |              |              |
|---------------|----------------------------------|--------------|--------------|--------------|--|--------------|--------------|--------------|
|               | Period 1972-1981                 |              |              | 1981         | Period 1972-1981                           |              |              |              |
|               | Average                          | Maximum      | Minimum      |              | Average                                    | Maximum      | Minimum      |              |
| Jan.          | 48.3                             | 38.7         | 69.1         | 11.8         | 39.8                                       | 42.1         | 55.7         | 27.1         |
| Feb.          | 42.0                             | 29.2         | 50.0         | 10.5         | 35.3                                       | 39.9         | 55.0         | 25.9         |
| Mar.          | 48.8                             | 42.4         | 76.5         | 9.9          | 52.0                                       | 47.5         | 58.0         | 32.4         |
| Apr.          | 48.8                             | 35.8         | 50.2         | 9.1          | 50.9                                       | 47.3         | 62.8         | 32.3         |
| May           | 46.7                             | 39.4         | 52.9         | 9.1          | 49.0                                       | 50.0         | 63.9         | 36.6         |
| June          | 36.2                             | 40.9         | 57.5         | 27.2         | 48.9                                       | 52.7         | 66.7         | 37.4         |
| July          | 36.4                             | 44.1         | 73.6         | 28.6         | 47.2                                       | 53.9         | 65.6         | 40.6         |
| Aug.          | 43.4                             | 41.2         | 59.4         | 13.1         | 49.2                                       | 57.0         | 68.1         | 38.8         |
| Sept.         | 36.6                             | 36.7         | 51.6         | 15.2         | 47.4                                       | 51.4         | 59.9         | 38.6         |
| Oct.          | 35.1                             | 43.8         | 101.3        | 14.5         | 47.4                                       | 50.8         | 61.4         | 38.4         |
| Nov.          | 36.6                             | 40.2         | 72.2         | 13.3         | 46.3                                       | 48.9         | 62.0         | 36.3         |
| Dec.          | 40.4                             | 40.5         | 60.6         | 12.6         | 44.1                                       | 44.7         | 56.9         | 27.8         |
| <b>Yearly</b> | <b>499.3</b>                     | <b>472.9</b> | <b>660.1</b> | <b>191.3</b> | <b>557.5</b>                               | <b>586.2</b> | <b>721.9</b> | <b>420.6</b> |

**STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN**  
**In Thousands of Acre-Feet**

Data are presented below for all storage reservoirs in the Rio Grande Basin in the United States and Mexico that exceed 15,000 acre-feet in capacity, except San Esteban Reservoir on Alamito Creek which, according to the Texas Water Development Board, originally had a capacity of 18,800 acre-feet. There are no monthly storage data available for this reservoir. Also presented on pages 86 and 87 are data for International Amistad and Falcon Reservoirs on the Rio Grande. The monthly figures represent the water in storage on the last day of each month, in thousands of acre-feet. The capacities indicated are at spillway level. Storage figures greater than the capacity indicate that the water surface was above spillway level.

The reservoirs and the agencies providing the data are: Rio Grande, Continental, Santa Maria, Terrace, Mountain Home, and Platoro from the State of Colorado; Division of Water Resources; Sanchez from the Sanchez Ditch and Reservoir Company; Abiquiu, Cochiti, and Santa Rosa from the United States Corps of Engineers; Costilla, Bluewater, Lake Summer, McMillan, and Avalon from the United States Geological Survey; Storrie from the State Engineer Office of New Mexico; Heron, El Vado, Elephant Butte, and Caballo from the United States Bureau of Reclamation; Red Bluff from the Red Bluff Water Power Control District; Lake Casa Blanca from the Webb County Office; Delta from the Willacy County Water Control and Improvement District No. 1; La Boquilla, La Colina, and Rosetilla from the Federal Power Commission of Mexico; Francisco I. Madero, Chihuahua, Luis L. Leon, Centenario, San Miguel, Venustiano Carranza, Laguna de Salinillas, La Boca, Marte R. Gomez, Culebron, Villa Cardenas, and Palito Blanco from the Ministry of Agriculture and Hydraulic Resources of Mexico; Amistad Reservoir (International) and Falcon Reservoir (International) from the International Boundary and Water Commission.

The monthly storage data for Sanchez Reservoir was not received in time for printing in this bulletin.

### In the United States

| Month | RIO GRANDE<br>(Capacity 51.1) |                        | CONTINENTAL<br>(Capacity 22.7) |                        | SANTA MARIA<br>(Capacity 45.1) |                        | TERRACE<br>(Capacity 17.2) |                        | MOUNTAIN HOME<br>(Capacity 18.6) |                        |
|-------|-------------------------------|------------------------|--------------------------------|------------------------|--------------------------------|------------------------|----------------------------|------------------------|----------------------------------|------------------------|
|       | # Average<br>1981             | # Average<br>1927-1981 | 1981                           | # Average<br>1928-1981 | 1981                           | # Average<br>1928-1981 | 1981                       | # Average<br>1925-1981 | 1981                             | # Average<br>1924-1981 |
| Jan.  | 21.4                          | 14.1                   | 7.7                            | 4.7                    | 10.6                           | 6.7                    | 0                          | 3.6                    | 4.0                              | 3.5                    |
| Feb.  | 23.1                          | 15.2                   | 8.0                            | 5.1                    | 10.8                           | 7.1                    | 0                          | 3.9                    | 4.1                              | 3.8                    |
| Mar.  | 23.4                          | 16.5                   | 8.4                            | 5.6                    | 11.0                           | 7.9                    | 1.7                        | 4.3                    | 4.2                              | 4.2                    |
| Apr.  | 26.4                          | 17.0                   | 8.6                            | 6.1                    | 8.2                            | 9.0                    | 1.8                        | 5.2                    | 4.1                              | 4.7                    |
| May   | 16.8                          | 20.8                   | 8.6                            | 7.8                    | 2.3                            | 12.0                   | 2.0                        | 6.8                    | 3.4                              | 6.3                    |
| June  | 9.3                           | 22.0                   | 6.5                            | 8.0                    | .4                             | 13.6                   | 1.8                        | 8.1                    | 3.0                              | 6.5                    |
| July  | 13.4                          | 13.4                   | 6.5                            | 5.4                    | .3                             | 9.3                    | 1.1                        | 5.5                    | 2.4                              | 4.8                    |
| Aug.  | 15.4                          | 7.8                    | 7.0                            | 3.7                    | .2                             | 5.3                    | .8                         | 3.5                    | 2.0                              | 3.0                    |
| Sept. | 17.3                          | 7.9                    | 7.0                            | 3.6                    | .2                             | 5.0                    | .9                         | 3.0                    | 2.0                              | 2.6                    |
| Oct.  | 16.6                          | 8.9                    | 7.1                            | 3.5                    | .2                             | 5.2                    | 2.2                        | 3.1                    | 2.1                              | 2.6                    |
| Nov.  | 20.7                          | 11.4                   | 2.9                            | 3.9                    | 4.3                            | 5.8                    | 3.3                        | 3.1                    | 2.2                              | 2.9                    |
| Dec.  | 22.7                          | 13.0                   | 3.6                            | 4.4                    | 4.7                            | 6.3                    | 4.9                        | 3.4                    | 2.3                              | 3.2                    |
| Avg.  | 18.9                          | 14.0                   | 6.8                            | 5.2                    | 4.4                            | 7.8                    | 1.7                        | 4.5                    | 3.0                              | 4.0                    |
| Max.  | 26.4                          | 52.1                   | 8.6                            | 26.7                   | 11.0                           | 42.1                   | 4.9                        | 17.7                   | 4.2                              | 16.4                   |
| Min.  | 9.3                           | 0                      | 2.9                            | 0                      | 0.2                            | 0                      | 0                          | 0                      | 2.0                              | 0                      |

| Month | SANCHEZ<br>(Capacity 103.2) |                        | PLATORO<br>(Capacity 60.0) |                      | COSTILLA<br>(Capacity 15.7) |                        | HERON<br>(Capacity 401.3) |                      | EL VADO<br>(Capacity 196.5) |                      |
|-------|-----------------------------|------------------------|----------------------------|----------------------|-----------------------------|------------------------|---------------------------|----------------------|-----------------------------|----------------------|
|       | 1981                        | # Average<br>1927-1980 | 1981                       | Average<br>1952-1981 | 1981                        | # Average<br>1922-1981 | 1981                      | Average<br>1971-1981 | 1981                        | Average<br>1935-1981 |
| Jan.  |                             | 10.7                   | 19.7                       | 8.5                  | 5.8                         | 4.3                    | 311.6                     | 140.8                | 107.8                       | 40.4                 |
| Feb.  |                             | 10.9                   | 19.7                       | 8.5                  | 6.1                         | 4.6                    | 310.9                     | 141.1                | 107.8                       | 38.3                 |
| Mar.  |                             | 11.4                   | 19.7                       | 8.7                  | 6.7                         | 5.2                    | 310.0                     | 141.2                | 107.8                       | 38.9                 |
| Apr.  |                             | 12.8                   | 19.9                       | 9.4                  | 7.6                         | 6.3                    | 319.0                     | 146.1                | 124.1                       | 73.9                 |
| May   |                             | 16.2                   | 19.8                       | 11.0                 | 6.3                         | 8.1                    | 333.5                     | 173.2                | 123.9                       | 113.8                |
| June  |                             | 15.9                   | 19.8                       | 17.3                 | 4.4                         | 7.5                    | 349.6                     | 200.1                | 92.3                        | 105.3                |
| July  |                             | 11.7                   | 19.8                       | 15.9                 | 2.1                         | 5.0                    | 338.4                     | 205.6                | 79.6                        | 87.3                 |
| Aug.  |                             | 9.3                    | 19.7                       | 14.7                 | 1.0                         | 3.3                    | 327.0                     | 203.8                | 79.5                        | 67.2                 |
| Sept. |                             | 9.5                    | 19.7                       | 14.9                 | 1.4                         | 2.9                    | 324.5                     | 201.9                | 76.0                        | 55.5                 |
| Oct.  |                             | 9.9                    | 19.7                       | 14.7                 | 2.1                         | 3.2                    | 322.3                     | 201.9                | 79.2                        | 51.2                 |
| Nov.  |                             | 10.2                   | 19.8                       | 10.2                 | 2.6                         | 3.5                    | 320.1                     | 201.3                | 79.4                        | 42.1                 |
| Dec.  |                             | 10.6                   | 19.9                       | 10.2                 | 3.0                         | 3.9                    | 294.2                     | 169.0                | 98.9                        | 41.4                 |
| Avg.  |                             | 11.6                   | 19.8                       | 12.0                 | 4.1                         | 4.8                    | 321.8                     | 177.2                | 96.6                        | 62.9                 |
| Max.  |                             | 62.4                   | 19.9                       | 54.0                 | 7.6                         | 15.1                   | 349.6                     | 356.0                | 124.1                       | 203.5                |
| Min.  |                             | 0                      | 19.7                       | 0                    | 1.0                         | 0                      | 294.2                     | 0.6                  | 79.0                        | 0                    |

Some months missing

## STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

In Thousands of Acre-Feet

## In the United States

| Month | ABIQUIU<br>(Capacity 1,212.0) |                        | COCHITI<br>(Capacity 496.6) |                        | BLUEWATER<br>(Capacity 43.5) |                        | ELEPHANT BUTTE<br>(Capacity 2,110.3) |                      | CABALLO<br>(Capacity 344.0) |                        |
|-------|-------------------------------|------------------------|-----------------------------|------------------------|------------------------------|------------------------|--------------------------------------|----------------------|-----------------------------|------------------------|
|       | 1981                          | # Average<br>1965-1981 | 1981                        | # Average<br>1973-1981 | 1981                         | # Average<br>1927-1981 | 1981                                 | Average<br>1915-1981 | 1981                        | # Average<br>1938-1981 |
| Jan.  | 40.5                          | 10.8                   | 46.3                        | 37.7                   | 27.0                         | 7.1                    | 1,205.2                              | 732.1                | 130.7                       | 94.7                   |
| Feb.  | 40.2                          | 10.6                   | 47.3                        | 37.6                   | 26.6                         | 7.7                    | 1,183.9                              | 736.1                | 156.0                       | 117.7                  |
| Mar.  | 40.0                          | 11.1                   | 47.2                        | 37.8                   | 26.4                         | 11.1                   | 1,201.3                              | 715.5                | 68.2                        | 98.2                   |
| Apr.  | 39.1                          | 16.9                   | 46.0                        | 38.8                   | 26.6                         | 14.6                   | 1,115.8                              | 707.1                | 68.1                        | 95.2                   |
| May   | 38.6                          | 51.5                   | 46.3                        | 46.5                   | 24.0                         | 13.0                   | 990.7                                | 794.6                | 95.2                        | 98.4                   |
| June  | 37.6                          | 46.2                   | 46.4                        | 56.6                   | 21.3                         | 10.8                   | 872.8                                | 821.9                | 96.0                        | 83.4                   |
| July  | 36.8                          | 35.6                   | 45.9                        | 41.6                   | 19.6                         | 9.4                    | 799.5                                | 767.5                | 67.2                        | 65.8                   |
| Aug.  | 36.7                          | 35.1                   | 46.2                        | 42.0                   | 17.5                         | 8.4                    | 765.9                                | 712.9                | 21.3                        | 38.5                   |
| Sept. | 36.0                          | 35.5                   | 46.2                        | 41.9                   | 16.2                         | 8.0                    | 754.0                                | 689.5                | 12.9                        | 27.6                   |
| Oct.  | 35.6                          | 34.0                   | 46.2                        | 42.9                   | 15.6                         | 7.6                    | 758.0                                | 689.5                | 16.4                        | 41.0                   |
| Nov.  | 35.4                          | 21.9                   | 46.2                        | 38.8                   | 14.9                         | 7.4                    | 745.7                                | 707.0                | 59.0                        | 55.4                   |
| Dec.  | 35.3                          | 15.3                   | 46.2                        | 40.0                   | 14.7                         | 7.2                    | 725.3                                | 726.9                | 108.6                       | 73.7                   |
| Avg.  | 37.6                          | 27.0                   | 46.4                        | 41.8                   | 20.9                         | 9.4                    | 926.5                                | 733.4                | 75.0                        | 74.1                   |
| Max.  | 40.5                          | 194.0                  | 47.3                        | 175.2                  | 27.0                         | 47.1                   | 81,217.4                             | 8 2,302.8            | 8157.0                      | 8346.6                 |
| Min.  | 35.3                          | 0                      | 45.9                        | 3.6                    | 14.7                         | 0                      | 8 725.3                              | 8 3.3                | 8 5.2                       | 8 0.1                  |

| Month | STORRIE<br>(Capacity 23.3) |                        | SANTA ROSA<br>(Capacity 499.0) |                      | LAKE SUMNER<br>(Capacity 101.6) |                        | McMILLAN & AVALON<br>(Capacity 38.0) |                        | RED BLUFF<br>(Capacity 310.0) |                        |
|-------|----------------------------|------------------------|--------------------------------|----------------------|---------------------------------|------------------------|--------------------------------------|------------------------|-------------------------------|------------------------|
|       | 1981                       | # Average<br>1939-1981 | 1981                           | Average<br>1980-1981 | 1981                            | # Average<br>1937-1981 | 1981                                 | # Average<br>1908-1981 | 1981                          | # Average<br>1936-1981 |
| Jan.  | 6.1                        | 7.1                    | 3.2                            | 1.6                  | 28.2                            | 64.2                   | 28.7                                 | 25.7                   | 76.9                          | 94.1                   |
| Feb.  | 5.6                        | 7.1                    | 3.2                            | 1.6                  | 32.2                            | 68.2                   | 27.7                                 | 25.9                   | 74.3                          | 95.7                   |
| Mar.  | 5.6                        | 7.9                    | 3.4                            | 1.7                  | 32.0                            | 57.2                   | 25.3                                 | 25.7                   | 73.2                          | 92.8                   |
| Apr.  | 5.1                        | 8.2                    | 3.4                            | 3.0                  | 30.6                            | 50.1                   | 12.4                                 | 17.1                   | 76.2                          | 80.9                   |
| May   | 4.6                        | 8.5                    | .5                             | 8.7                  | 21.4                            | 52.3                   | 5.9                                  | 18.9                   | 72.1                          | 82.9                   |
| June  | 4.1                        | 7.2                    | 0                              | 13.6                 | 2.7                             | 46.1                   | 12.5                                 | 18.5                   | 60.6                          | 83.2                   |
| July  | 3.3                        | 7.2                    | 0                              | 0                    | 10.5                            | 44.2                   | 6.2                                  | 17.7                   | 55.8                          | 74.2                   |
| Aug.  | 4.3                        | 7.9                    | 28.8                           | 14.4                 | 31.0                            | 48.1                   | 14.6                                 | 16.6                   | 56.0                          | 69.8                   |
| Sept. | 5.4                        | 7.4                    | 36.6                           | 19.6                 | 33.3                            | 50.4                   | 12.6                                 | 17.8                   | 51.8                          | 74.2                   |
| Oct.  | 6.7                        | 7.1                    | 37.9                           | 20.3                 | 32.6                            | 53.0                   | 11.2                                 | 19.5                   | 53.1                          | 83.0                   |
| Nov.  | 6.7                        | 7.1                    | 37.6                           | 20.2                 | 36.8                            | 55.5                   | 14.5                                 | 21.2                   | 54.9                          | 86.0                   |
| Dec.  | 6.7                        | 6.7                    | 37.5                           | 20.2                 | 40.4                            | 60.1                   | 16.8                                 | 24.1                   | 57.7                          | 90.1                   |
| Avg.  | 5.4                        | 7.4                    | 16.0                           | 10.4                 | 27.6                            | 54.1                   | 15.7                                 | 20.7                   | 63.6                          | 83.9                   |
| Max.  | 6.7                        | 26.3                   | 37.9                           | 37.9                 | 40.4                            | 156.3                  | 28.7                                 | 85.5                   | 76.9                          | 327.5                  |
| Min.  | 3.3                        | 0                      | 0                              | 0                    | 2.7                             | 0.4                    | 5.9                                  | 0                      | 51.8                          | 10.0                   |

| Month | LAKE CASA BLANCA<br>(Capacity 19.1) |                      | * DELTA LAKE<br>(Capacity 25.0) |                       |  |  |  |  | TOTAL IN<br>U. S. RESERVOIRS<br>(Capacity 6,153.8) |                        |
|-------|-------------------------------------|----------------------|---------------------------------|-----------------------|--|--|--|--|--|------------------------|
|       | 1981                                | Average<br>1962-1981 | 1981                            | #Average<br>1939-1981 |  |  |  |  | 1981   | Estimated<br>! Average |
| Jan.  | 12.7                                | 13.2                 | 16.9                            | 15.4                  |  |  |  |  | 2,111.0  | 1,341.0                |
| Feb.  | 12.6                                | 12.9                 | 15.8                            | 14.7                  |  |  |  |  | 2,115.9  | 1,374.3                |
| Mar.  | 12.2                                | 12.6                 | 13.5                            | 14.0                  |  |  |  |  | 2,041.2  | 1,329.5                |
| Apr.  | 16.4                                | 12.8                 | 18.4                            | 14.1                  |  |  |  |  | 1,977.8  | 1,349.3                |
| May   | 21.9                                | 13.8                 | 19.4                            | 14.8                  |  |  |  |  | 1,857.2  | 1,579.9                |
| June  | 19.6                                | 14.0                 | 17.4                            | 14.9                  |  |  |  |  | 1,678.1  | 1,620.7                |
| July  | 15.6                                | 13.4                 | 15.1                            | 14.7                  |  |  |  |  | 1,539.1  | 1,455.2                |
| Aug.  | 18.2                                | 13.7                 | 17.0                            | 13.7                  |  |  |  |  | 1,510.1  | 1,342.7                |
| Sept. | 19.0                                | 15.1                 | 15.4                            | 15.0                  |  |  |  |  | 1,491.4  | 1,308.8                |
| Oct.  | 18.4                                | 14.5                 | 15.4                            | 15.3                  |  |  |  |  | 1,498.6  | 1,331.9                |
| Nov.  | 17.4                                | 14.2                 | 16.3                            | 15.2                  |  |  |  |  | 1,540.7  | 1,344.3                |
| Dec.  | 17.4                                | 13.9                 | 15.7                            | 14.8                  |  |  |  |  | 1,576.5  | 1,358.4                |
| Avg.  | 16.8                                | 13.7                 | 16.4                            | 14.7                  |  |  |  |  | 1,744.8  | 1,394.7                |
| Max.  | 21.9                                | 28.2                 | 19.4                            | 22.6                  |  |  |  |  | 2,115.9  |                        |
| Min.  | 12.2                                | 3.5                  | 13.5                            | 0                     |  |  |  |  | 1,491.4  |                        |

# Some months missing      @ Daily extremes      ! Totals of period averages in all reservoirs

\* Formerly called Willacy

**STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN**  
**In Thousands of Acre-Foot**

**In Mexico**

| Month | LA BOQUILLA<br>(Capacity 2,417.5) |                        | LA COLINA<br>(Capacity 19.5) |                      | ROSETILLA<br>(Capacity 15.4) |                      | FRANCISCO I.<br>MADERO<br>(Capacity 282.2) |                        | CHIHUAHUA<br>(Capacity 25.9) |                      |
|-------|-----------------------------------|------------------------|------------------------------|----------------------|------------------------------|----------------------|--|------------------------|------------------------------|----------------------|
|       | 1981                              | # Average<br>1914-1981 | 1981                         | Average<br>1940-1981 | 1981                         | Average<br>1940-1981 | 1981                                       | # Average<br>1948-1981 | 1981                         | Average<br>1961-1981 |
| Jan.  | 2,315.8                           | 1,470.1                | 19.9                         | 17.9                 | 13.9                         | 12.6                 | 279.8                                      | 227.0                  | 11.1                         | 8.5                  |
| Feb.  | 2,260.1                           | 1,434.8                | 20.0                         | 18.4                 | 13.9                         | 12.5                 | 253.8                                      | 223.1                  | 10.7                         | 8.2                  |
| Mar.  | 2,205.4                           | 1,381.7                | 20.1                         | 18.5                 | 13.9                         | 11.9                 | 235.9                                      | 209.0                  | 10.1                         | 7.8                  |
| Apr.  | 2,182.8                           | 1,309.5                | 20.1                         | 18.9                 | 13.9                         | 11.6                 | 213.1                                      | 175.3                  | 9.6                          | 7.3                  |
| May   | 2,010.9                           | 1,242.5                | 20.1                         | 18.6                 | 13.9                         | 11.7                 | 165.4                                      | 145.7                  | 8.8                          | 6.7                  |
| June  | 1,929.0                           | 1,161.5                | 19.9                         | 18.8                 | 13.9                         | 12.0                 | 131.6                                      | 126.9                  | 7.9                          | 6.2                  |
| July  | 1,901.1                           | 1,196.7                | 19.9                         | 18.8                 | 13.9                         | 11.9                 | 106.4                                      | 139.2                  | 7.5                          | 6.4                  |
| Aug.  | 2,247.0                           | 1,365.6                | 20.1                         | 18.4                 | 13.9                         | 12.9                 | 258.8                                      | 174.7                  | 12.6                         | 7.8                  |
| Sept. | 2,673.2                           | 1,547.3                | 20.0                         | 18.2                 | 13.9                         | 13.1                 | 265.6                                      | 221.6                  | 18.6                         | 10.5                 |
| Oct.  | 2,756.7                           | 1,557.6                | 19.9                         | 18.0                 | 13.8                         | 13.1                 | 281.6                                      | 229.5                  | 18.5                         | 10.3                 |
| Nov.  | 2,756.7                           | 1,523.6                | 19.9                         | 16.3                 | 13.9                         | 12.4                 | 280.8                                      | 229.8                  | 17.9                         | 10.0                 |
| Dec.  | 2,756.7                           | 1,508.4                | 19.9                         | 18.2                 | 13.9                         | 12.9                 | 280.6                                      | 230.7                  | 17.3                         | 9.5                  |
| Avg.  | 2,333.0                           | 1,391.6                | 20.0                         | 18.2                 | 13.9                         | 12.4                 | 229.4                                      | 194.4                  | 12.6                         | 8.3                  |
| Max.  | 2,756.7                           | 2,756.7                | 20.1                         | 22.5                 | 13.9                         | 19.4                 | 281.6                                      | 366.6                  | 18.6                         | 26.5                 |
| Min.  | 1,901.1                           | 16.9                   | 19.9                         | 11.6                 | 13.9                         | 0                    | 106.4                                      | 1.4                    | 7.5                          | 0.2                  |

| Month | LUIS L. LEON<br>(Capacity 689.1) |                      | CENTENARIO and<br>SAN MIGUEL<br>(Capacity 19.9) |                      | VENUSTIANO<br>CARRANZA<br>(Capacity 1,122.8) |                      | LAGUNA DE<br>SALINILLAS<br>(Capacity 15.4) |                      | LA BOCA<br>(Capacity 33.2) |                      |
|-------|----------------------------------|----------------------|---|----------------------|--|----------------------|--|----------------------|----------------------------|----------------------|
|       | 1981                             | Average<br>1968-1981 | 1981  | Average<br>1934-1981 | 1981   | Average<br>1930-1981 | 1981                                       | Average<br>1931-1981 | 1981                       | Average<br>1963-1981 |
| Jan.  | 475.4                            | 409.0                | 18.4  | 13.3                 | 1,132.4                                      | 472.6                | 12.4                                       | 7.4                  | 34.9                       | 28.4                 |
| Feb.  | 419.9                            | 404.6                | 19.4  | 13.2                 | 1,126.0                                      | 451.9                | 13.5                                       | 9.3                  | 34.9                       | 28.4                 |
| Mar.  | 348.9                            | 375.9                | 18.3  | 10.0                 | 1,110.0                                      | 428.4                | 9.4  | 7.3                  | 34.9                       | 27.9                 |
| Apr.  | 323.3                            | 342.4                | 18.8  | 8.7                  | 1,126.0                                      | 416.8                | 14.8                                       | 8.8                  | 36.8                       | 27.0                 |
| May   | 321.3                            | 318.4                | 16.6  | 9.3                  | 1,127.5                                      | 399.3                | 12.1                                       | 8.8                  | 35.3                       | 26.5                 |
| June  | 283.7                            | 315.1                | 15.2  | 7.8                  | 1,043.9                                      | 379.2                | 13.9                                       | 8.0                  | 35.3                       | 26.3                 |
| July  | 299.2                            | 328.2                | 13.3  | 7.4                  | 976.7  | 389.9                | 14.0                                       | 7.5                  | 35.0                       | 26.4                 |
| Aug.  | 279.1                            | 337.9                | 11.9  | 8.1                  | 994.3  | 397.4                | 14.1                                       | 7.6                  | 34.5                       | 27.3                 |
| Sept. | 292.7                            | 411.7                | 12.1  | 10.2                 | 1,048.6                                      | 451.0                | 12.8                                       | 8.4                  | 34.2                       | 29.0                 |
| Oct.  | 523.2                            | 438.8                | 12.8  | 12.4                 | 1,098.9                                      | 488.1                | 12.1                                       | 7.8                  | 35.3                       | 29.8                 |
| Nov.  | 517.8                            | 443.1                | 14.5  | 12.6                 | 1,126.0                                      | 497.1                | 10.4                                       | 7.2                  | 34.9                       | 29.6                 |
| Dec.  | 494.1                            | 449.0                | 14.8  | 13.0                 | 1,105.2                                      | 495.3                | 13.1                                       | 7.0                  | 33.6                       | 29.4                 |
| Avg.  | 381.6                            | 381.2                | 15.5  | 10.5                 | 1,084.6                                      | 438.9                | 12.7                                       | 7.9                  | 35.0                       | 28.0                 |
| Max.  | 0 523.2                          | 0 753.1              | 19.4  | 20.7                 | 01,151.5                                     | 01,167.8             | 014.8                                      | 15.8                 | 36.8                       | 36.8                 |
| Min.  | 0 275.5                          | 0 3.8                | 11.9  | 0                    | 0 976.7                                      | * 1.0                | 0 9.4                                      | 0                    | 33.6                       | 0                    |

| Month | MARTE R. GOMEZ<br>(Capacity 889.3) |                        | CULEBRON and<br>VILLA CARDENAS<br>(Capacity 90.0) |                        | PALITO BLANCO<br>(Capacity 124.0) |                      |      |  | TOTAL IN MEXICAN<br>RESERVOIRS<br>(Capacity 5,744.2) |                        |
|-------|------------------------------------|------------------------|---|------------------------|-----------------------------------|----------------------|------|--|--|------------------------|
|       | 1981                               | # Average<br>1943-1981 | 1981  | # Average<br>1939-1981 | 1981                              | Average<br>1942-1981 | 1981 |  | 1981   | Estimated<br>! Average |
| Jan.  | 317.6                              | 618.4                  | 0   | 30.4                   | 0                                 | 31.8                 |      |  | 4,631.6  | 3,347.4                |
| Feb.  | 339.9                              | 573.3                  | 0   | 28.0                   | 0                                 | 27.6                 |      |  | 4,512.1  | 3,233.3                |
| Mar.  | 351.5                              | 544.6                  | 0   | 26.2                   | 0                                 | 27.4                 |      |  | 4,358.4  | 3,076.6                |
| Apr.  | 455.9                              | 507.5                  | 0   | 27.5                   | 0                                 | 25.3                 |      |  | 4,115.1  | 2,886.6                |
| May   | 588.8                              | 469.8                  | 0   | 29.2                   | 0                                 | 25.4                 |      |  | 4,320.7  | 2,711.9                |
| June  | 785.3                              | 468.4                  | 0   | 30.8                   | 0                                 | 27.6                 |      |  | 4,279.6  | 2,588.6                |
| July  | 813.5                              | 458.8                  | 0   | 27.1                   | 0                                 | 26.6                 |      |  | 4,200.5  | 2,644.9                |
| Aug.  | 825.1                              | 503.7                  | 0   | 29.0                   | 0                                 | 24.3                 |      |  | 4,711.4  | 2,914.7                |
| Sept. | 890.7                              | 627.3                  | 0   | 35.6                   | 0                                 | 34.5                 |      |  | 5,282.4  | 3,418.4                |
| Oct.  | 893.6                              | 665.6                  | 0   | 37.1                   | 0                                 | 38.4                 |      |  | 5,666.5  | 3,546.5                |
| Nov.  | 880.7                              | 667.9                  | 0   | 31.3                   | 0                                 | 36.9                 |      |  | 5,673.5  | 3,517.8                |
| Dec.  | 870.6                              | 665.6                  | 0   | 34.6                   | 0                                 | 35.5                 |      |  | 5,619.8  | 3,509.1                |
| Avg.  | 667.8                              | 564.2                  | 0   | 30.6                   | 0                                 | 30.1                 |      |  | 4,806.0  | 3,116.3                |
| Max.  | 0 903.6                            | 0 1,465.4              | 0   | 116.8                  | 0                                 | 140.1                |      |  | 5,673.5  |                        |
| Min.  | 0 291.7                            | ** 17.8                | 0   | 0                      | 0                                 | 0                    |      |  | 4,200.5  |                        |

\* Some months missing      0 Daily extremes  
 ! Total of period averages in all reservoirs

\* Minimum since full reservoir in 1932  
 \*\* Minimum since full reservoir in 1947

## STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

### International Amistad Reservoir

Amistad Dam is the second of the major international storage dams constructed on the Rio Grande as authorized by the Water Treaty of 1944 between the United States and Mexico. It is located at mile 573.9, 12.9 river miles upstream from Del Rio, Texas and Cd. Acuna, Coahuila.

Maximum storage for period of record: 4,859,900 acre-feet on September 22, 1974 with an elevation of 1,135.66 feet above mean sea level, U. S. C. & G. S. datum. The elevation-area-capacity table based on the 1980 survey became effective on November 1, 1981.

#### Storage Capacities

(1980 Survey)

| Elevation | Description                             | At Indicated Elevation       |                      | Between Indicated Elevations |                     |
|-----------|---|------------------------------|----------------------|------------------------------|---------------------|
|           |   | Reservoir Capacity Acre-Feet | Reservoir Area Acres | Storage Volume Acre-Feet     | Type of Storage     |
| 898.0     | Original River Bed at Dam Axis          | 0                            | 0                    | 0                            |                     |
| 930.0     | Lowest Outlet (United States Penstocks) | 0                            | 0                    | 3,383,848                    |                     |
| 1,117.0   | Top of Conservation Storage *           | 3,383,848                    | 64,860               | 3,383,848                    | Silt & Conservation |
| 1,140.4   | Top of Spillway Gates                   | 5,128,000                    | 84,358               | 1,744,152                    | Ordinary Flood      |
| 1,145.1   | Maximum Water Surface                   | 5,535,000                    | 88,978               | 407,000                      | Surcharge           |

#### Storage in Thousands of Acre-Feet at 24:00 Hours 1981 — Annual and Period Summary

| Day | Jan.    | Feb.    | March   | April   | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.    |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1   | 3,107.0 | 3,106.0 | 3,131.7 | 3,179.4 | 3,350.0 | 3,499.8 | 3,535.0 | 3,510.4 | 3,536.0 | 3,532.8 | 3,699.5 | 3,742.6 |
| 2   | 3,105.0 | 3,103.0 | 3,133.6 | 3,179.4 | 3,384.2 | 3,501.9 | 3,535.0 | 3,512.5 | 3,535.0 | 3,537.1 | 3,701.8 | 3,740.4 |
| 3   | 3,105.0 | 3,102.1 | 3,139.6 | 3,179.4 | 3,394.6 | 3,504.0 | 3,533.9 | 3,513.6 | 3,531.8 | 3,541.4 | 3,701.4 | 3,741.5 |
| 4   | 3,103.0 | 3,101.1 | 3,140.6 | 3,178.4 | 3,400.8 | 3,509.3 | 3,531.8 | 3,514.7 | 3,529.6 | 3,544.6 | 3,707.4 | 3,740.4 |
| 5   | 3,102.1 | 3,101.1 | 3,141.6 | 3,177.4 | 3,509.3 | 3,531.8 | 3,516.8 | 3,526.4 | 3,548.9 | 3,710.8 | 3,738.1 |         |
| 6   | 3,102.1 | 3,101.1 | 3,142.5 | 3,175.4 | 3,413.4 | 3,509.3 | 3,528.5 | 3,518.9 | 3,520.0 | 3,559.6 | 3,713.1 | 3,738.1 |
| 7   | 3,101.1 | 3,102.1 | 3,143.5 | 3,175.4 | 3,423.8 | 3,510.4 | 3,526.4 | 3,520.0 | 3,515.7 | 3,568.2 | 3,714.2 | 3,738.1 |
| 8   | 3,101.1 | 3,102.1 | 3,143.5 | 3,176.4 | 3,434.3 | 3,511.5 | 3,524.3 | 3,524.3 | 3,514.7 | 3,583.4 | 3,716.5 | 3,739.2 |
| 9   | 3,101.1 | 3,104.0 | 3,144.5 | 3,177.4 | 3,440.6 | 3,513.6 | 3,523.2 | 3,524.3 | 3,513.6 | 3,589.8 | 3,717.6 | 3,739.2 |
| 10  | 3,102.1 | 3,105.0 | 3,145.5 | 3,176.4 | 3,441.7 | 3,514.7 | 3,526.4 | 3,524.3 | 3,510.4 | 3,597.4 | 3,719.9 | 3,740.4 |
| 11  | 3,102.1 | 3,103.0 | 3,149.5 | 3,176.4 | 3,445.9 | 3,515.7 | 3,525.3 | 3,524.3 | 3,518.9 | 3,738.0 | 3,719.9 | 3,742.6 |
| 12  | 3,101.1 | 3,105.0 | 3,163.4 | 3,176.4 | 3,448.0 | 3,514.7 | 3,524.3 | 3,524.3 | 3,527.5 | 3,755.8 | 3,722.2 | 3,746.0 |
| 13  | 3,101.1 | 3,106.0 | 3,155.5 | 3,178.4 | 3,452.2 | 3,514.3 | 3,524.2 | 3,526.4 | 3,533.9 | 3,807.4 | 3,724.4 | 3,747.2 |
| 14  | 3,101.1 | 3,107.0 | 3,157.4 | 3,198.4 | 3,455.3 | 3,512.5 | 3,523.2 | 3,526.4 | 3,536.0 | 3,817.5 | 3,726.7 | 3,749.5 |
| 15  | 3,101.1 | 3,108.9 | 3,160.4 | 3,215.5 | 3,459.5 | 3,535.0 | 3,522.1 | 3,526.4 | 3,539.2 | 3,808.5 | 3,730.1 | 3,749.5 |
| 16  | 3,101.1 | 3,111.0 | 3,161.4 | 3,216.5 | 3,461.7 | 3,550.0 | 3,520.0 | 3,532.8 | 3,563.0 | 3,805.1 | 3,732.4 | 3,752.0 |
| 17  | 3,105.0 | 3,112.9 | 3,163.4 | 3,271.1 | 3,465.9 | 3,551.0 | 3,518.9 | 3,544.6 | 3,532.8 | 3,818.7 | 3,734.7 | 3,754.0 |
| 18  | 3,106.0 | 3,115.8 | 3,164.4 | 3,291.5 | 3,469.0 | 3,551.0 | 3,516.8 | 3,547.8 | 3,528.5 | 3,823.2 | 3,738.1 | 3,752.9 |
| 19  | 3,106.0 | 3,116.8 | 3,164.4 | 3,295.6 | 3,469.0 | 3,550.0 | 3,513.6 | 3,546.8 | 3,525.3 | 3,822.0 | 3,740.4 | 3,754.0 |
| 20  | 3,106.0 | 3,116.8 | 3,164.4 | 3,294.5 | 3,471.2 | 3,548.9 | 3,512.5 | 3,542.5 | 3,522.1 | 3,820.9 | 3,739.2 | 3,756.3 |
| 21  | 3,107.0 | 3,118.8 | 3,165.4 | 3,298.6 | 3,472.2 | 3,547.8 | 3,511.5 | 3,535.0 | 3,517.9 | 3,815.3 | 3,739.2 | 3,757.4 |
| 22  | 3,108.0 | 3,119.8 | 3,166.4 | 3,305.8 | 3,475.4 | 3,547.8 | 3,509.3 | 3,524.3 | 3,515.7 | 3,826.6 | 3,741.5 | 3,759.7 |
| 23  | 3,108.0 | 3,120.8 | 3,166.4 | 3,309.9 | 3,479.6 | 3,546.8 | 3,508.3 | 3,514.7 | 3,513.6 | 3,820.9 | 3,742.6 | 3,758.6 |
| 24  | 3,108.9 | 3,121.8 | 3,167.4 | 3,313.0 | 3,482.8 | 3,545.7 | 3,507.2 | 3,509.3 | 3,514.7 | 3,813.0 | 3,742.6 | 3,760.9 |
| 25  | 3,109.9 | 3,123.7 | 3,169.4 | 3,316.0 | 3,483.9 | 3,545.7 | 3,506.2 | 3,513.6 | 3,514.7 | 3,809.6 | 3,743.8 | 3,763.2 |
| 26  | 3,109.9 | 3,125.7 | 3,169.4 | 3,323.2 | 3,486.0 | 3,545.7 | 3,506.2 | 3,517.9 | 3,518.9 | 3,802.9 | 3,744.9 | 3,767.8 |
| 27  | 3,110.9 | 3,127.7 | 3,171.4 | 3,325.3 | 3,489.2 | 3,545.3 | 3,506.2 | 3,521.1 | 3,522.1 | 3,806.3 | 3,743.8 | 3,771.2 |
| 28  | 3,109.9 | 3,129.7 | 3,174.4 | 3,327.3 | 3,492.3 | 3,541.4 | 3,505.1 | 3,525.3 | 3,525.3 | 3,809.6 | 3,744.9 | 3,774.6 |
| 29  | 3,109.9 | 3,129.7 | 3,176.4 | 3,333.5 | 3,494.5 | 3,538.2 | 3,505.1 | 3,527.5 | 3,526.4 | 3,813.0 | 3,743.8 | 3,774.6 |
| 30  | 3,108.9 | 3,177.4 | 3,341.8 | 3,498.7 | 3,536.0 | 3,506.2 | 3,530.7 | 3,532.7 | 3,526.4 | 3,815.3 | 3,744.9 | 3,776.9 |
| 31  | 3,108.0 | 3,179.4 |         |         | 3,499.8 |         | 3,508.3 | 3,531.8 |         | 3,817.5 |         | 3,779.2 |

| Month  | 1981              |         |     |                   |         |     | Period 1969-1981 |                      |         |
|--------|-------------------|---------|-----|-------------------|---------|-----|------------------|----------------------|---------|
|        | MOMENTARY MAXIMUM |         |     | MOMENTARY MINIMUM |         |     | Average Storage  | Mean Monthly Storage |         |
|        | Elevation         | Storage | Day | Elevation         | Storage | Day |                  | Average              | Maximum |
| Jan.   | 1,110.68          | 3,110.9 | 27  | 1,110.52          | 3,101.1 | 17  | 3,105.1          | 3,009.7              | 4,030.4 |
| Feb.   | 1,110.99          | 3,129.7 | 28  | 1,110.52          | 3,101.1 | 14  | 3,111.4          | 2,997.7              | 4,014.7 |
| Mar.   | 1,111.81          | 3,179.4 | 31  | 1,110.99          | 3,129.7 | 1   | 3,157.6          | 2,966.0              | 4,016.4 |
| Apr.   | 1,114.44          | 3,341.8 | 30  | 1,111.75          | 3,175.4 | 16  | 3,242.8          | 2,965.0              | 3,981.0 |
| May    | 1,116.91          | 3,499.8 | 31  | 1,114.44          | 3,341.8 | 1   | 3,453.0          | 2,935.1              | 3,829.5 |
| June   | 1,117.70          | 3,551.0 | 117 | 1,116.91          | 3,499.8 | 1   | 3,528.8          | 2,897.0              | 3,807.8 |
| July   | 1,117.47          | 3,536.0 | 1   | 1,117.00          | 3,505.1 | 128 | 3,518.6          | 2,867.0              | 3,847.3 |
| Aug.   | 1,117.65          | 3,547.8 | 18  | 1,117.04          | 3,508.3 | 1   | 3,524.9          | 2,971.4              | 3,941.3 |
| Sept.  | 1,117.52          | 3,539.2 | 15  | 1,117.08          | 3,510.4 | 10  | 3,524.3          | 3,043.2              | 4,117.2 |
| Oct.   | 1,121.80          | 3,826.6 | 22  | 1,117.32          | 3,526.4 | 1   | 3,728.1          | 3,198.9              | 4,471.2 |
| Nov.   | 1,122.38          | 3,744.9 | 126 | 1,121.67          | 3,696.1 | 1   | 3,728.2          | 3,220.5              | 4,241.4 |
| Dec.   | 1,122.87          | 3,779.2 | 31  | 1,122.28          | 3,738.1 | 5   | 3,753.1          | 3,230.0              | 4,029.7 |
| Yearly | 1,122.87          | 3,826.6 |     | 1,110.52          | 3,101.1 |     | 3,450.1          | 3,025.3              | 3,950.8 |
|        |                   |         |     |                   |         |     |                  |                      | 1,047.6 |

\* When necessary, the Commission may set temporary conservation levels

1 And other days

## STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

## International Falcon Reservoir

Falcon Dam is the lowermost of the major international storage dams authorized for construction on the Rio Grande by the Water Treaty of 1944 between the United States and Mexico and was the first dam constructed. It is located 86.1 river miles downstream from the old international highway bridge between Laredo, Texas and Nuevo Laredo, Tamaulipas and 274.8 river miles upstream from the Gulf of Mexico.

Maximum storage for period of record: 3,490,600 acre-feet on October 19, 1958 with an elevation of 308.11 feet above mean sea level, U. S. C. & G. S. datum.

## Storage Capacities

(1971-1972 Survey)

| Elevation | Description                      | At Indicated Elevation       |                      | Between Indicated Elevations |                     |
|-----------|----------------------------------|------------------------------|----------------------|------------------------------|---------------------|
|           |                                  | Reservoir Capacity Acre-Feet | Reservoir Area Acres | Storage Volume Acre-Feet     | Type of Storage     |
| 175.0     | Original River Bed at Dam Axis   | 0                            | 0                    | 67                           | Dead                |
| 203.3     | Lowest Outlet (Mexican Penstock) | 67                           | 89                   | 2,667,521                    | Silt & Conservation |
| 301.2     | Top of Conservation Storage *    | 2,667,588                    | 86,843               | 509,505                      | Ordinary Flood      |
| 306.7     | Top of Spillway Gates            | 3,177,093                    | 98,512               | 801,323                      | Surcharge           |
| 314.2     | Maximum Water Surface            | 3,978,416                    | 115,406              |                              |                     |

## Storage in Thousands of Acre-Feet at 24:00 Hours 1981 — Annual and Period Summary

| Day | Jan.    | Feb.    | March   | April   | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.    |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1   | 2,175.4 | 2,283.0 | 2,362.0 | 2,420.4 | 2,725.4 | 2,716.5 | 2,719.2 | 2,691.1 | 2,660.6 | 2,687.6 | 2,759.0 | 2,765.3 |
| 2   | 2,178.3 | 2,286.8 | 2,364.4 | 2,418.0 | 2,760.8 | 2,711.3 | 2,701.6 | 2,686.7 | 2,666.7 | 2,687.6 | 2,759.0 | 2,763.5 |
| 3   | 2,181.3 | 2,291.5 | 2,366.7 | 2,415.5 | 2,844.5 | 2,706.9 | 2,685.0 | 2,686.5 | 2,676.3 | 2,685.9 | 2,759.0 | 2,762.6 |
| 4   | 2,184.3 | 2,297.7 | 2,369.1 | 2,413.1 | 2,905.1 | 2,705.1 | 2,677.2 | 2,676.3 | 2,683.3 | 2,684.1 | 2,759.0 | 2,761.7 |
| 5   | 2,187.3 | 2,303.9 | 2,370.7 | 2,411.5 | 2,937.5 | 2,693.7 | 2,671.9 | 2,670.2 | 2,686.7 | 2,679.8 | 2,760.8 | 2,760.0 |
| 6   | 2,191.0 | 2,305.5 | 2,371.5 | 2,409.1 | 2,955.3 | 2,685.0 | 2,685.0 | 2,661.5 | 2,689.4 | 2,678.0 | 2,763.5 | 2,759.9 |
| 7   | 2,189.5 | 2,307.8 | 2,372.3 | 2,405.9 | 2,965.1 | 2,676.3 | 2,679.8 | 2,652.0 | 2,689.4 | 2,685.0 | 2,765.3 | 2,759.9 |
| 8   | 2,188.8 | 2,310.1 | 2,373.1 | 2,401.9 | 2,972.1 | 2,676.3 | 2,724.5 | 2,642.5 | 2,689.4 | 2,688.5 | 2,767.0 | 2,759.9 |
| 9   | 2,189.5 | 2,314.8 | 2,373.9 | 2,397.1 | 2,975.9 | 2,676.3 | 2,735.1 | 2,633.0 | 2,687.6 | 2,691.1 | 2,767.9 | 2,759.9 |
| 10  | 2,191.0 | 2,319.5 | 2,379.5 | 2,392.3 | 2,962.8 | 2,677.2 | 2,723.6 | 2,625.3 | 2,682.4 | 2,686.7 | 2,767.0 | 2,759.0 |
| 11  | 2,192.5 | 2,323.4 | 2,389.9 | 2,387.5 | 2,950.6 | 2,676.3 | 2,706.0 | 2,618.4 | 2,676.3 | 2,681.5 | 2,766.2 | 2,759.0 |
| 12  | 2,197.8 | 2,328.9 | 2,392.3 | 2,382.7 | 2,937.5 | 2,681.5 | 2,685.9 | 2,612.4 | 2,671.9 | 2,675.4 | 2,766.2 | 2,759.0 |
| 13  | 2,204.5 | 2,335.2 | 2,394.7 | 2,378.7 | 2,927.3 | 2,699.0 | 2,672.8 | 2,606.5 | 2,669.3 | 2,664.1 | 2,765.3 | 2,759.0 |
| 14  | 2,210.5 | 2,339.9 | 2,397.9 | 2,376.3 | 2,915.5 | 2,706.9 | 2,669.3 | 2,600.4 | 2,674.5 | 2,665.0 | 2,764.4 | 2,759.0 |
| 15  | 2,213.5 | 2,343.8 | 2,404.3 | 2,383.5 | 2,901.4 | 2,715.7 | 2,674.5 | 2,594.5 | 2,679.8 | 2,673.7 | 2,765.3 | 2,759.0 |
| 16  | 2,217.3 | 2,345.4 | 2,408.3 | 2,405.1 | 2,886.6 | 2,736.0 | 2,678.0 | 2,588.6 | 2,681.5 | 2,680.6 | 2,766.2 | 2,759.0 |
| 17  | 2,221.1 | 2,346.2 | 2,410.7 | 2,422.0 | 2,871.0 | 2,764.4 | 2,680.6 | 2,584.3 | 2,684.1 | 2,697.2 | 2,766.2 | 2,758.1 |
| 18  | 2,225.6 | 2,347.0 | 2,413.1 | 2,439.8 | 2,859.1 | 2,784.0 | 2,683.3 | 2,580.1 | 2,684.1 | 2,723.6 | 2,765.3 | 2,758.1 |
| 19  | 2,230.9 | 2,347.0 | 2,414.7 | 2,461.0 | 2,842.7 | 2,784.9 | 2,685.0 | 2,578.4 | 2,686.7 | 2,729.8 | 2,765.3 | 2,757.2 |
| 20  | 2,236.3 | 2,347.0 | 2,416.4 | 2,481.5 | 2,825.5 | 2,784.9 | 2,686.7 | 2,581.8 | 2,690.2 | 2,735.1 | 2,764.4 | 2,756.4 |
| 21  | 2,241.6 | 2,347.8 | 2,419.6 | 2,508.1 | 2,804.7 | 2,784.9 | 2,688.5 | 2,584.3 | 2,691.1 | 2,743.0 | 2,763.5 | 2,754.6 |
| 22  | 2,243.9 | 2,348.5 | 2,422.0 | 2,533.1 | 2,784.9 | 2,783.1 | 2,690.2 | 2,588.6 | 2,692.0 | 2,752.8 | 2,762.6 | 2,753.7 |
| 23  | 2,247.7 | 2,349.3 | 2,422.0 | 2,553.9 | 2,765.3 | 2,781.3 | 2,692.0 | 2,597.1 | 2,692.0 | 2,757.2 | 2,762.6 | 2,753.7 |
| 24  | 2,251.5 | 2,350.1 | 2,422.0 | 2,579.2 | 2,747.5 | 2,777.8 | 2,694.6 | 2,605.6 | 2,690.2 | 2,761.7 | 2,762.6 | 2,752.8 |
| 25  | 2,255.3 | 2,351.7 | 2,422.0 | 2,745.7 | 2,772.4 | 2,697.2 | 2,618.4 | 2,688.5 | 2,766.2 | 2,762.6 | 2,752.8 |         |
| 26  | 2,261.4 | 2,353.3 | 2,421.2 | 2,641.6 | 2,736.8 | 2,768.8 | 2,699.9 | 2,633.0 | 2,686.7 | 2,761.7 | 2,763.5 | 2,752.8 |
| 27  | 2,265.3 | 2,355.7 | 2,420.4 | 2,665.0 | 2,728.0 | 2,764.4 | 2,699.0 | 2,638.2 | 2,685.9 | 2,760.8 | 2,764.4 | 2,751.9 |
| 28  | 2,268.3 | 2,358.8 | 2,419.6 | 2,681.5 | 2,723.6 | 2,755.5 | 2,699.0 | 2,648.5 | 2,686.7 | 2,760.0 | 2,765.3 | 2,751.0 |
| 29  | 2,273.0 | 2,360.1 | 2,420.4 | 2,697.2 | 2,720.1 | 2,746.6 | 2,699.0 | 2,652.9 | 2,688.5 | 2,759.0 | 2,766.2 | 2,751.0 |
| 30  | 2,276.0 | 2,360.4 | 2,713.9 | 2,724.5 | 2,735.1 | 2,696.4 | 2,654.6 | 2,688.5 | 2,758.1 | 2,767.0 | 2,767.0 | 2,751.0 |
| 31  | 2,280.7 | 2,420.4 | 2,721.8 | 2,721.8 | 2,693.7 | 2,657.2 |         |         |         | 2,759.0 |         | 2,749.2 |

| Month  | 1981              |         |     |                   |         |     | Period 1954-1981 |                      |         |
|--------|-------------------|---------|-----|-------------------|---------|-----|------------------|----------------------|---------|
|        | MOMENTARY MAXIMUM |         |     | MOMENTARY MINIMUM |         |     | Average Storage  | Mean Monthly Storage |         |
|        | Elevation         | Storage | Day | Elevation         | Storage | Day |                  | Average              | Maximum |
| Jan.   | 296.48            | 2,280.7 | 31  | 295.03            | 2,170.9 | 1   | 2,221.7          | 2,206.3              | 3,070.8 |
| Feb.   | 297.48            | 2,358.8 | 28  | 296.48            | 2,280.7 | 1   | 2,330.0          | 2,104.4              | 3,099.6 |
| Mar.   | 298.27            | 2,422.0 | 122 | 297.48            | 2,358.8 | 1   | 2,399.2          | 2,078.7              | 2,990.8 |
| Apr.   | 301.73            | 2,713.9 | 30  | 297.70            | 2,376.3 | 14  | 2,479.8          | 1,983.7              | 2,954.6 |
| May    | 304.61            | 2,975.9 | 9   | 301.73            | 2,713.9 | 1   | 2,842.7          | 1,871.2              | 2,869.9 |
| June   | 302.53            | 2,784.9 | 119 | 301.30            | 2,676.3 | 17  | 2,730.9          | 1,790.8              | 2,789.1 |
| July   | 301.97            | 2,735.1 | 11  | 301.22            | 2,669.3 | 14  | 2,692.7          | 1,881.8              | 2,692.7 |
| Aug.   | 301.50            | 2,693.7 | 1   | 300.16            | 2,578.4 | 19  | 2,627.2          | 1,868.4              | 2,771.4 |
| Sept.  | 301.48            | 2,692.0 | 122 | 301.08            | 2,657.2 | 1   | 2,683.3          | 1,971.4              | 2,871.1 |
| Oct.   | 302.32            | 2,766.2 | 25  | 301.16            | 2,664.1 | 13  | 2,713.5          | 2,210.1              | 3,250.2 |
| Nov.   | 302.34            | 2,767.9 | 9   | 302.24            | 2,759.0 | 1   | 2,764.1          | 2,280.7              | 3,124.5 |
| Dec.   | 302.33            | 2,767.0 | 1   | 302.13            | 2,749.2 | 31  | 2,757.1          | 2,308.9              | 3,129.7 |
| Yearly | 304.61            | 2,975.9 |     | 295.03            | 2,170.9 |     | 2,605.1          | 2,046.3              | 2,764.2 |

! And other days

\* When necessary, the Commission may set temporary conservation levels

**QUALITY OF WATER - 1981****Rio Grande at El Paso, Texas**

**LOCATION:** At gaging station on Courchesne Bridge at river mile 1,255.7 (2,020.8 km); 5.5 river miles (8.9 km) upstream from Paso del Norte Bridge between El Paso, Texas and Cd. Juarez, Chihuahua.

**RECORDS:** Chemical analyses, February 1930 through 1981; biochemical analyses, September 1943 through 1972 and February 1976 through 1981; specific conductance 1930 through 1932 and 1937 through 1981; suspended silt, 1947 through 1976.

**REMARKS:** Sampling by International Boundary and Water Commission; chemical analyses by U.S. Geological Survey, biochemical analyses by Waste Water Treatment Plant Laboratory; specific conductance and silt determinations by International Boundary and Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by U. S. Geological Survey.

| 1981<br>Date | Time<br>Standard | Streamflow,<br>Momentary<br>Second-Feet | Specific<br>Conductance<br>Microhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|---|-------------------------------------|-------------|---------------------------|---|--|---|---|
| Jan. 23      | 1000             | 48.9                                    | 2,520                               | 8.2         | 5.5                       | 490   | 220  | 140                                       | 34  |
| Feb. 18      | 1220             | 117                                     | 1,790                               | 8.1         | 14.0                      | 370   | 130  | 110                                       | 24  |
| Mar. 18      | 1100             | 506                                     | 897                                 | 7.9         | 11.0                      | 240   | 70   | 71  | 14  |
| Apr. 14      | 1630             | 590                                     | 1,060                               | 7.5         | 20.0                      | 260   | 19   | 80  | 15  |
| May 21       | 0745             | 804                                     | 899                                 | 7.8         | 20.0                      | 230   | 61   | 71  | 13  |
| June 15      | 0700             | 922                                     | 925                                 | 7.7         | 23.0                      | 250   | 67   | 76  | 14  |
| July 15      | 0700             | 717                                     | 994                                 | 7.7         | 24.5                      | 260   | 77   | 78  | 15  |
| Aug. 20      | 0755             | 572                                     | 1,300                               | 7.9         | 23.5                      | 320   | 110  | 96  | 19  |
| Sep. 15      | 1220             | 961                                     | 1,000                               | 7.9         | 26.0                      | 260   | 77   | 78  | 15  |
| Oct. 22      | 1240             | 146                                     | 2,100                               | 8.1         | 19.0                      | 480   | 210  | 140                                       | 32  |
| Nov. 17      | 0745             | 98.9                                    | 2,250                               | 8.2         | 11.0                      | 490   | 210  | 140                                       | 34  |
| Dec. 16      | 1000             | 74.8                                    | 2,330                               | 8.1         | 6.5                       | 480   | 220  | 140                                       | 32  |

Samples taken at American Dam

| 1981<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|--|--|---|--|---|---|
| Jan. 23      | 380                                      | 7.5                                | 10   | 270  | 620   | 330  | 29  | 1,710                                       |
| Feb. 18      | 250                                      | 5.6                                | 8.0  | 240  | 350   | 210  | 23  | 1,120                                       |
| Mar. 18      | 100                                      | 3.1                                | 5.4  | 170  | 220   | 210  | 18  |   |
| Apr. 14      | 122                                      | 3.2                                | 7.2  | 180  | 220   | 108  | 19  | 643   |
| May 21       | 94                                       | 2.7                                | 6.3  | 170  | 180   | 68   | 18  | 553   |
| June 15      | 100                                      | 2.8                                | 6.4  | 180  | 190   | 76   | 20  | 591   |
| July 15      | 110                                      | 3.1                                | 7.3  | 180  | 200   | 83   | 21  | 623   |
| Aug. 20      | 160                                      | 4.1                                | 9.0  | 210  | 270   | 140  | 23  | 843   |
| Sep. 15      | 110                                      | 3.1                                | 7.0  | 180  | 210   | 89   | 21  | 638   |
| Oct. 22      | 280                                      | 5.6                                | 13   | 270  | 490   | 240  | 27  | 1,380                                       |
| Nov. 17      | 320                                      | 6.3                                | 12   | 280  | 560   | 270  | 28  | 1,500                                       |
| Dec. 16      | 340                                      | 6.7                                | 11   | 260  | 520   | 280  | 27  | 1,510                                       |

Samples taken at American Dam

| 1981<br>Date | Temper-<br>ature<br>Deg C | Oxygen,<br>Dissolved<br>(DO)<br>mg/L | pH<br>Units | Coli-<br>form,<br>Fecal<br>Colonies<br>/100 mL | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>mg/L | 1981<br>Date | Temper-<br>ature<br>Deg C | Oxygen<br>Dissolved<br>(DO)<br>mg/L | pH<br>Units | Coli-<br>form,<br>Fecal<br>Colonies<br>/100 mL | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>mg/L |
|--------------|---------------------------|--------------------------------------|-------------|--|--|--------------|---------------------------|-------------------------------------|-------------|--|--|
| Jan. 6       | 11.1                      | 10.0                                 | 8.0         | 330  | 2  | July 7       | 26.1                      | 7.2                                 | 7.9         | 780  | 4  |
| 13           | 8.9                       | 9.4                                  | 7.5         | 570  | 3  | 14           | 25.0                      | 6.7                                 | 7.9         | 500  | 2  |
| 20           | 6.1                       | 10.0                                 | 7.9         | 225  | 4  | 21           | 26.1                      | 8.1                                 | 2,700       | 5  |  |
| 27           | 8.9                       | 9.7                                  | 7.4         | 165  | 2  | 28           | 28.9                      | 6.6                                 | 8.2         | 4,200  | 2  |
| Feb. 3       | 6.7                       | 11.0                                 | 7.9         | 190  | 3  | Aug. 4       | 25.0                      | 6.8                                 | 7.5         | 1,200  | 4  |
| 10           | 8.9                       | 10.2                                 | 210         | 6  | 11   | 23.9         | 8.2                       | 8.1                                 | 250,000     | 2  |  |
| 17           | 10.0                      | 9.0                                  | 7.9         | 150  |  | 25           | 23.9                      | 8.4                                 | 1,800       | 1  |  |
| 26           | 7.2                       | 9.1                                  | 7.8         | 320  | 3  | 8            | 21.1                      | 8.1                                 | 200         | 2  |  |
| Mar. 3       | 7.2                       | 8.5                                  | 7.7         | 1  | 8  | 15           | 22.2                      | 7.8                                 | 3,800       | 4  |  |
| 10           | 8.9                       | 9.2                                  | 8.1         | 105  | 4  | 22           | 20.0                      | 8.2                                 | 2,300       | 4  |  |
| 17           | 12.2                      | 8.4                                  | 8.1         | 50   | 6  | 29           | 18.9                      | 8.0                                 | 5,200       | 3  |  |
| 24           | 12.8                      | 9.0                                  | 6.3         | 260  | 5  | Oct. 6       | 18.9                      | 8.0                                 | 560         | 2  |  |
| Apr. 7       | 15.0                      | 8.4                                  | 7.7         | 250  | 4  | 13           | 15.0                      | 8.7                                 | 9.60        | 2  |  |
| 14           | 17.2                      | 7.7                                  | 8.0         | 210  | 4  | 20           | 15.0                      | 8.7                                 | 760         | 3  |  |
| 21           | 17.8                      | 8.4                                  | 8.0         | 25,000   | 5  | 27           | 12.8                      | 8.6                                 | 7.9         | 670  | 2  |
| 28           | 20.0                      | 7.9                                  | 8.3         | 180  | 3  | Nov. 3       | 11.1                      | 10.1                                | 8.0         | 590  | 2  |
| May 5        | 22.8                      | 7.0                                  | 7.7         | 230  | 4  | 10           | 10.0                      | 9.3                                 | 8.3         | 900  | 2  |
| 12           | 17.8                      | 8.2                                  | 135         | 4  | 17   | 11.1         | 9.4                       | 8.3                                 | 690         | 2  |  |
| 19           | 17.2                      | 7.4                                  | 8.2         | 300  | 6  | 24           | 8.9                       | 8.9                                 | 8.4         | 650  | 1  |
| 26           | 21.1                      | 6.6                                  | 7.3         | 3,900  | 5  | Dec. 1       | 7.8                       | 9.9                                 | 8.1         | 1,680  | 2  |
| June 2       | 21.1                      | 6.4                                  | 7.3         | 1,300  | 3  | 8            | 7.8                       | 10.1                                | 8.3         | 720  | 2  |
| 9            | 23.9                      | 8.0                                  | 245         | 3  | 15   | 7.8          | 9.7                       | 7.8                                 | 660         | 2  |  |
| 16           | 20.0                      | 7.2                                  | 1,300       |  | 22   | 12.2         | 9.6                       | 8.1                                 | 380         | 2  |  |
| 23           | 23.9                      | 6.8                                  | 330         |  |  |              |                           |                                     |             |  |  |
| 30           | 23.9                      | 6.5                                  | 2,000       | 4  |  |              |                           |                                     |             |  |  |

**QUALITY OF WATER - 1981****Rio Grande at El Paso, Texas**

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   |       |       |       |       | 910   | 1,160 | 895   |       | 944   | 2,040 |       | 2,220 |
| 2   | 2,280 | 2,410 | 1,210 | 927   |       | 896   | 820   |       | 931   | 2,050 | 2,120 | 2,310 |
| 3   |       | 2,400 | 914   |       |       | 893   |       | 858   | 978   |       | 2,130 | 2,360 |
| 4   |       | 2,500 | 846   |       | 946   |       |       | 920   |       |       |       |       |
| 5   |       |       | 809   |       |       |       |       | 956   |       | 1,950 | 2,190 |       |
| 6   |       | 2,400 |       | 989   | 951   | 940   |       | 937   | 1,090 |       | 1,950 | 2,290 |
| 7   |       | 2,370 |       |       | 939   |       |       | 930   | 957   |       | 1,980 |       |
| 8   |       |       |       |       | 994   |       |       | 1,000 |       | 782   | 2,120 | 2,340 |
| 9   | 2,340 |       | 943   | 1,040 | 1,040 |       |       | 1,090 |       | 867   | 2,120 | 2,340 |
| 10  |       |       | 918   | 1,050 | 990   |       | 1,000 | 1,010 | 896   | 924   |       | 2,260 |
| 11  |       |       | 1,050 | 1,110 |       |       | 1,080 |       | 1,030 |       |       | 2,290 |
| 12  | 2,350 | 1,050 | 970   |       |       |       |       | 991   |       |       | 2,350 |       |
| 13  | 2,330 | 1,060 | 966   |       | 981   |       |       | 990   |       | 1,180 | 2,120 | 2,350 |
| 14  | 2,340 |       |       |       | 980   | 876   | 843   | 962   |       | 914   | 2,130 | 2,320 |
| 15  | 2,450 |       |       |       |       |       |       |       |       |       | 2,120 |       |
| 16  |       |       |       | 987   |       | 833   | 991   |       | 1,120 |       |       | 2,260 |
| 17  |       | 1,800 | 925   |       |       | 813   | 924   |       | 1,570 |       |       | 2,330 |
| 18  |       | 1,950 | 863   |       |       | 862   |       |       |       |       | 2,270 | 2,440 |
| 19  | 2,240 |       | 876   |       |       | 892   |       |       |       |       | 2,270 | 2,400 |
| 20  | 2,350 |       | 958   | 983   |       |       |       |       |       |       | 2,290 | 2,370 |
| 21  |       |       |       |       | 862   |       |       |       |       |       |       | 2,390 |
| 22  | 2,540 | 2,240 | 871   | 1,110 | 989   | 928   | 883   | 1,070 |       | 1,740 | 2,100 | 2,410 |
| 23  | 2,590 | 2,180 | 866   | 1,110 |       |       | 878   | 1,090 |       | 1,850 | 2,190 | 2,510 |
| 24  |       | 2,190 | 902   |       |       |       | 930   |       |       | 1,870 |       | 2,450 |
| 25  |       |       |       |       |       |       | 937   |       |       |       | 2,320 | 2,330 |
| 26  | 2,590 | 2,280 | 908   |       | 983   | 988   | 906   |       |       |       | 2,190 | 2,440 |
| 27  | 2,480 | 2,300 | 932   | 1,110 |       |       |       | 888   |       |       | 2,190 |       |
| 28  | 2,600 |       |       |       | 993   |       | 804   | 829   |       | 1,900 | 2,170 | 2,450 |
| 29  | 2,600 |       |       |       |       |       | 819   | 818   |       |       | 2,190 | 2,370 |
| 30  | 2,520 |       |       | 878   | 1,130 |       |       | 872   |       | 1,940 |       | 2,430 |
| 31  |       |       |       |       |       |       |       | 841   |       |       |       | 2,440 |

Samples taken at American Dam

**Rio Grande at Riverside Canal Heading near El Paso, Texas  
and Cd. Juarez, Chihuahua**

LOCATION: At river mile 1,237.3 (1,991.2 km), 9.5 miles (15.3 km) downstream from the Haskell R. Street Waste Water Treatment Plant and 16.7 river miles (26.8 km) downstream from the American Dam at El Paso, Texas.

RECORDS: Biochemical analyses, February 1976 through 1981. Samples also collected quarterly by the Texas Department of Water Resources one mile upstream at Yaleta-Zaragoza Bridge, 1937 through 1972 and May 1975 through 1981.

REMARKS: Sampling by International Boundary and Water Commission. Analyses by the Waste Water Treatment Plant Laboratory in El Paso.

| 1981<br>Date | Temper-<br>ature<br>Deg C | Oxygen,<br>Dissolved<br>(DO)<br>mg/L | pH  | Coli-<br>form,<br>Fecal<br>Colonies<br>/100 mL | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>mg/L |  | 1981<br>Date | Temper-<br>ature<br>Deg C | Oxygen<br>Dissolved<br>(DO)<br>mg/L | pH | Coli-<br>form,<br>Fecal<br>Colonies<br>/100 mL | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>mg/L |
|--------------|---------------------------|--------------------------------------|-----|--|--|--|--------------|---------------------------|-------------------------------------|----|--|--|
|              |                           |                                      |     |  |  |  |              |                           |                                     |    |  |  |
| Jan. 6       | 11.1                      | 10.4                                 | 8.1 | 40   | 4  |  | July 7       | 33.9                      | 6.8                                 |    | 1,200  | 4  |
| 13           | 7.8                       | 9.2                                  | 7.4 | 1,050  | 7.5  |  | 14           | 27.2                      | 6.6                                 |    | 1,200  | 3  |
| 20           | 6.1                       | 9.6                                  |     | 165  |  |  | 21           | 27.2                      |                                     |    | 1,300  | 145  |
| 27           | 10.0                      | 9.8                                  | 7.2 | 30   |  |  | 28           | 26.1                      | 5.4                                 |    | 240,000  |  |
| Feb. 3       | 8.9                       | 11.0                                 | 7.5 | 10   | 9  |  | Aug. 4       | 26.1                      | 6.8                                 |    | 2,000  | 4  |
| 10           | 8.9                       | 9.6                                  |     | 270  | 16   |  | 11           | 23.9                      | 7.4                                 |    | 25,000   |  |
| 26           | 8.9                       | 10.0                                 | 7.0 | 0  | 8  |  |              |                           |                                     |    |  |  |
| Mar. 3       | 12.2                      | 7.9                                  | 7.7 | 0  | 8  |  | 25           |                           |                                     |    |  |  |
| 10           | 10.0                      | 8.6                                  | 7.8 | 380  | 8  |  | 25.0         |                           |                                     |    |  |  |
| 17           | 12.8                      | 8.2                                  | 8.1 | 0  | 11   |  | 8            | 21.1                      |                                     |    | 800  | 3  |
| 24           | 13.9                      | 8.2                                  | 8.1 | 15   |  |  | 15           | 21.1                      |                                     |    | 300  | 5  |
| Apr. 7       | 15.0                      | 8.2                                  | 7.8 | 100  | 10   |  | 22           | 22.2                      |                                     |    | 1,200  | 6  |
| 14           | 17.8                      | 6.9                                  | 7.6 | 185  | 12   |  | 29           | 22.2                      |                                     |    | 2,000  | 6  |
| 21           | 18.9                      | 7.9                                  | 7.8 | 500  | 12   |  | Oct. 6       | 21.1                      |                                     |    | 192,000  | 8  |
| 28           | 21.7                      | 6.9                                  | 7.5 | 100  | 8  |  | 13           |                           | 6.5                                 |    | 3,500  | 5  |
| May 5        | 23.9                      | 6.3                                  | 7.6 | 240  | 12   |  | 20           | 17.8                      | 7.4                                 |    | 690  | 6  |
| 12           | 18.9                      | 8.0                                  |     | 290  |  |  | 27           | 15.0                      |                                     |    | 160  |  |
| 19           | 18.9                      | 6.8                                  | 8.0 | 240  | 14   |  |              |                           |                                     |    |  |  |
| 26           | 22.8                      | 6.8                                  | 7.9 | 510  |  |  | 3            | 15.0                      | 7.8                                 |    | 7.8  | 10   |
| June 2       | 22.2                      | 6.7                                  | 7.5 | 320  | 7  |  | 10           | 12.2                      | 8.1                                 |    | 7.8  | 9  |
| 9            |                           |                                      | 7.9 | 420  | 7  |  | 17           | 13.9                      | 7.3                                 |    | 7.6  | 14   |
| 16           | 21.1                      | 6.8                                  |     | 510  |  |  | 24           | 12.8                      | 7.2                                 |    | 7.9  | 16   |
| 23           | 26.1                      | 6.2                                  | 7.7 | 210  |  |  | Dec. 1       | 10.0                      | 8.2                                 |    | 8.0  | 5  |
| 30           | 25.0                      | 6.4                                  | 7.1 | 6,100  | 6  |  | 8            | 12.2                      | 7.8                                 |    | 7.7  | 9  |
|              |                           |                                      |     |  |  |  | 15           | 11.1                      | 7.5                                 |    | 7.7  | 10   |
|              |                           |                                      |     |  |  |  | 22           | 8.9                       | 9.0                                 |    | 7.9  | 19   |

QUALITY OF WATER - 1981

## Rio Grande at Fort Quitman, Texas near Colonia Luis Leon, Chihuahua

LOCATION: Gaging station at river mile 1,173.2 (1,888.1 km); 1.5 river miles (2.4 km) downstream from old Fort Quitman.

RECORDS: Chemical analyses, February 1938 through 1981; biochemical analyses, October 1974 through 1981; specific conductance (daily), October 1974 through 1977.

REMARKS: Sampling and analyses by U. S. Geological Survey. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey. Sampling prior to 1977 by the International Boundary and Water Commission.

## QUALITY OF WATER - 1981

## Rio Grande above Rio Conchos near Presidio, Texas and Ojinaga, Chihuahua

**LOCATION:** Gaging station at river mile 966.4 (1,555.3 km); 5.1 river miles (10.5 km) upstream from the Rio Conchos.

**RECORDS:** Chemical analyses, February 1933 through 1981; specific conductance, 1931; 1935 through 1981.

**REMARKS:** Sampling by the International Boundary and Water Commission; chemical analyses by the U.S. Geological Survey; determinations for specific conductance by International Boundary and Water Commission. Results of biochemical analyses by Texas Department of Water Resources, November 1977 through 1981, available on request.

| 1981<br>Date | Time<br>Standard | Streamflow,<br>Momentary<br>Second-Feet | Specific<br>Conductance<br>Micromhos | pH<br>Units | Tempera-<br>ture<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|---|--------------------------------------|-------------|---------------------------|---|--|---|---|
| Jan. 20      | 1425             | 49.1                                    | 4,380                                | 8.0         | 6.5                       | 790   | 560  | 220                                       | 59  |
| Feb. 18      | 1500             | 72.7                                    | 4,680                                | 7.7         | 17.0                      | 870   | 660  | 240                                       | 66  |
| Mar. 16      | 1325             | 31.4                                    | 4,450                                | 7.8         | 14.5                      | 860   | 640  | 240                                       | 63  |
| Apr. 20      | 1400             | 32.5                                    | 4,240                                | 8.0         |                           | 1,100   | 880  | 320                                       | 65  |
| May 18       | 1145             | 23.0                                    | 3,370                                | 7.6         | 24.0                      | 650   | 470  | 190                                       | 42  |
| June 17      | 1150             | 9.2                                     | 1,950                                | 7.6         |                           | 420   | 240  | 130                                       | 24  |
| July 21      | 1130             | 22.2                                    | 1,740                                | 7.7         | 21.0                      | 380   | 230  | 120                                       | 20  |
| Aug. 19      | 1345             | 770                                     | 684                                  | 7.5         | 27.0                      | 170   | 22   | 57  | 7.1   |
| Sep. 23      | 0824             | 420                                     | 2,100                                | 7.7         | 24.0                      | 420   | 230  | 130                                       | 23  |
| Oct. 14      | 0850             | 554                                     | 2,010                                | 7.7         | 21.0                      | 420   | 260  | 130                                       | 23  |
| Nov. 18      | 1120             | 118                                     | 4,280                                | 7.6         | 16.0                      | 790   | 590  | 220                                       | 59  |
| Dec. 15      | 1600             | 96.1                                    | 4,590                                | 7.6         | 12.0                      | 800   | 580  | 220                                       | 62  |

| 1981<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|--|--|---|--|---|---|
| Jan. 20      | 680                                      | 11                                 | 12   | 230  | 780   | 920  | 12  | 2,820                                       |
| Feb. 18      | 690                                      | 10                                 | 11   | 210  | 830   | 960  | 11  | 2,930                                       |
| Mar. 16      | 660                                      | 9.8                                | 11   | 220  | 800   | 910  | 17  | 2,830                                       |
| Apr. 20      | 520                                      | 6.9                                | 12   | 190  | 900   | 780  | 18  | 2,730                                       |
| May 18       | 500                                      | 8.6                                | 11   | 180  | 680   | 630  | 17  | 2,180                                       |
| June 17      | 250                                      | 5.3                                | 7.6  | 180  | 480   | 230  | 28  | 1,260                                       |
| July 21      | 230                                      | 5.4                                | 7.9  | 150  | 430   | 200  | 27  | 1,130                                       |
| Aug. 19      | 75                                       | 2.6                                | 7.9  | 150  | 120   | 50   | 11  | 418   |
| Sep. 23      | 270                                      | 5.7                                | 11   | 190  | 340   | 370  | 12  | 1,270                                       |
| Oct. 14      | 250                                      | 5.3                                | 8.9  | 160  | 350   | 350  | 7.0   | 1,220                                       |
| Nov. 18      | 640                                      | 9.9                                | 12   | 200  | 770   | 900  | 8.5   | 2,730                                       |
| Dec. 15      | 690                                      | 11                                 | 12   | 220  | 780   | 1,000                                      | 8.2   | 2,900                                       |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January  | March    | April         | June            | August            | September       | October          |
|----------|----------|---------------|-----------------|-------------------|-----------------|------------------|
| 6 4,120  | 9 4,270  | 24 1,470      | 15 1,940        | 7 1,260           | 11 617          | 26 3,870         |
| 12 4,110 | 16 4,450 | 28 2,020      | 22 3,210        | 11 1,500          | 13 963          | November         |
| 20 4,240 | 23 4,470 |               | May 30 1,840    | 18 789            | 18 1,590        | 2 4,660          |
| 26 5,260 | 30 3,300 | 1 2,410       | July 20 1,460   | 21 774            | 21 2,000        | 10 4,750         |
| February | April    | 4 2,030       | 1 2,240         | 25 1,400          | 25 2,430        | 17 4,360         |
| 3 4,560  | 6 3,680  | 11 2,470      | 7 1,460         | 31 2,470          | 29 2,930        | 24 4,430         |
| 9 4,390  | 13 2,190 | 18 3,350      | 14 1,900        | September 1 3,110 | October 4 1,950 | December 7 4,580 |
| 18 4,690 | 15 854   | 26 2,590      | 21 1,690        | 2 2,860           | 6 1,480         | 14 4,610         |
| 23 3,470 | 15 866   | June 28 1,630 | 28 1,630        | 9 853             | 13 1,760        | 21 4,690         |
| March    | 16 1,520 | 1 2,630       | August 10 1,290 | 10 566            | 20 3,010        | 28 4,750         |
| 3 3,980  | 20 4,140 | 8 2,150       | 4 1,290         |                   |                 |                  |

## QUALITY OF WATER - 1981

## Rio Conchos near Ojinaga, Chihuahua

LOCATION: At gaging station, 1.5 river miles (2.5 km) from the confluence with the Rio Grande, which is located at river mile 961.4 (1,547.2 km).

RECORDS: Chemical analyses, February 1935 through 1981; suspended silt, 1956 through 1979, specific conductance 1935 through 1981.

REMARKS: Sampling and determinations for suspended silt and specific conductance by the International Boundary and Water Commission; chemical analyses by the U. S. Geological Survey.

| 1981<br>Date | Time<br>Standard | Streamflow,<br>Momentary<br>Second-Feet | Specific<br>Conductance<br>Micromhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|---|--------------------------------------|-------------|---------------------------|---|--|---|---|
| Jan. 20      | 1610             | 939                                     | 1,170                                | 8.1         | 300                       | 130   | 95   | 14  |   |
| Feb. 20      | 1315             | 1,320                                   | 1,150                                | 8.1         | 290                       | 120   | 92   | 14  |   |
| Mar. 16      | 1650             | 1,500                                   | 1,140                                | 7.1         | 300                       | 130   | 96   | 14  |   |
| Apr. 20      | 1530             | 795                                     | 1,320                                | 7.9         | 300                       | 160   | 110  | 16  |   |
| May 19       | 1340             | 558                                     | 1,330                                | 7.9         | 25.5                      | 320   | 150  | 100                                       | 16  |
| June 17      | 1245             | 1,270                                   | 1,170                                | 7.7         | 25.0                      | 260   | 110  | 80  | 14  |
| July 21      | 1200             | 597                                     | 1,300                                | 7.7         | 30.0                      | 290   | 140  | 89  | 17  |
| Aug. 19      | 1220             | 2,090                                   | 1,150                                | 7.9         | 28.0                      | 270   | 100  | 88  | 13  |
| Sep. 23      | 0905             | 6,040                                   | 776                                  | 7.9         | 24.0                      | 190   | 51   | 62  | 8.8   |
| Oct. 15      | 0800             | 5,790                                   | 741                                  | 8.0         | 23.0                      | 190   | 53   | 63  | 8.6   |
| Nov. 18      | 0940             | 1,040                                   | 903                                  | 8.1         | 17.0                      | 250   | 85   | 80  | 11  |
| Dec. 15      | 1530             | 1,430                                   | 783                                  | 8.0         | 15.5                      | 220   | 65   | 74  | 9.7   |

| 1981<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|--|--|---|--|---|---|
| Jan. 20      | 140                                      | 3.5                                | 5.7  | 170  | 360   | 75   | 29  | 821   |
| Feb. 20      | 140                                      | 3.6                                | 5.7  | 170  | 340   | 55   | 29  | 778   |
| Mar. 16      | 130                                      | 3.3                                | 5.7  | 170  | 330   | 61   | 30  | 769   |
| Apr. 20      | 160                                      | 3.8                                | 6.5  | 180  | 400   | 72   | 28  | 901   |
| May 19       | 170                                      | 4.2                                | 6.5  | 170  | 370   | 82   | 29  | 876   |
| June 17      | 150                                      | 4.1                                | 6.1  | 150  | 340   | 62   | 31  | 773   |
| July 21      | 170                                      | 4.5                                | 7.4  | 150  | 380   | 82   | 34  | 870   |
| Aug. 19      | 140                                      | 3.8                                | 7.1  | 170  | 340   | 49   | 32  | 771   |
| Sep. 23      | 91                                       | 3.0                                | 5.4  | 140  | 210   | 26   | 28  | 515   |
| Oct. 15      | 78                                       | 2.5                                | 5.0  | 140  | 180   | 26   | 25  | 470   |
| Nov. 18      | 94                                       | 2.7                                | 5.6  | 160  | 240   | 49   | 25  | 591   |
| Dec. 15      | 81                                       | 2.4                                | 5.1  | 160  | 180   | 36   | 26  | 508   |

## QUALITY OF WATER - 1981

## Rio Conchos near Ojinaga, Chihuahua

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January  | April    | May      | June     | August    | September | October  |
|----------|----------|----------|----------|-----------|-----------|----------|
| 3 1,140  | 6 1,140  | 18 1,260 | 29 1,250 | 12 1,200  | 7 1,260   | 19 760   |
| 5 1,060  | 9 1,080  | 21 1,230 | July     | 13 920    | 8 915     | 21 756   |
| 8 1,050  | 13 1,130 | 25 1,300 | 2 1,170  | 14 746    | 9 630     | 26 837   |
| 13 1,050 | 15 1,120 | 28 1,280 | 6 1,200  | 17 1,060  | 11 1,160  | 28 797   |
| 15 1,150 | 20 1,270 | June     | 9 1,250  | 19 1,150  | 14 1,080  | 30 762   |
| 19 1,130 | 23 1,290 | 1 1,200  | 13 1,060 | 21 1,180  | 16 1,050  | November |
| 22 1,100 | 27 1,210 | 4 1,170  | 16 1,230 | 24 1,130  | 17 1,010  | 3 731    |
| 26 1,330 | 30 1,310 | 8 1,220  | 30 1,270 | 26 1,140  | 23 783    | December |
| 29 1,500 | May      | 11 1,180 | August   | 28 1,120  | 25 768    | 8 736    |
| February | 4 975    | 15 1,180 | 3 1,210  | 31 1,140  | 28 794    | 10 745   |
| 2 1,130  | 7 1,170  | 18 1,200 | 6 1,140  | September | 30 932    | 14 773   |
| 5 1,110  | 11 1,360 | 22 1,190 | 7 1,200  | 2 1,230   | October   | 17 827   |
| 9 1,050  | 14 1,310 | 25 1,240 | 10 1,300 | 4 1,280   | 2 1,120   | 21 830   |
|          |          |          |          |           | 5 1,450   | 31 1,190 |

## Rio Grande below Rio Conchos near Presidio, Texas and Ojinaga, Chihuahua

LOCATION: Gaging station at river mile 949.8 (1,258.5 km); 0.4 river mile (0.6 km) downstream from Alamito Creek and 11.6 river miles (18.7 km) downstream from the Rio Conchos.

RECORDS: Specific conductance, 1956 through 1981.

REMARKS: Sampling and determinations for specific conductance by the International Boundary and Water Commission. Results of biochemical analyses by Texas Department of Water Resources, November 1977 through 1981, available on request.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January  | February | April    | May      | July      | September | October  |
|----------|----------|----------|----------|-----------|-----------|----------|
| 2 1,510  | 20 1,230 | 15 968   | 26 1,320 | 14 1,290  | 9 637     | 26 1,090 |
| 6 1,280  | 23 1,140 | 16 1,160 | June     | 21 1,310  | 14 1,060  | November |
| 12 1,270 | March    | 20 1,300 | 1 1,410  | 28 1,250  | 21 963    | 2 999    |
| 13 1,360 | 3 1,250  | 23 1,560 | 8 1,170  | August    | 25 859    | 10 955   |
| 20 1,210 | 9 1,120  | 24 744   | 11 1,120 | 4 1,200   | 29 1,220  | 17 1,200 |
| 26 1,890 | 16 1,220 | 28 1,410 | 15 1,220 | 11 934    | October   | 24 1,860 |
| 28 2,160 | 23 1,120 | May      | 22 1,200 | 18 822    | 2 1,410   | 30 1,930 |
| February | 31 1,110 | 4 996    | 30 1,130 | 25 1,150  | 6 944     | December |
| 3 1,380  | April    | 8 1,220  | July     | 31 1,420  | 9 1,030   | 7 1,010  |
| 6 1,260  | 3 1,220  | 11 1,400 | 1 1,210  | September | 14 834    | 14 1,040 |
| 9 1,180  | 6 1,130  | 18 1,470 | 7 1,200  | 2 1,580   | 20 967    | 21 1,050 |
|          |          |          |          |           |           | 28 1,680 |

## QUALITY OF WATER - 1981

## Rio Grande at Foster Ranch near Langtry, Texas and Rancho Santa Rosa, Coahuila

**LOCATION:** Gaging station at river mile 657.5 (1,058.2 km), about 12.3 miles (19.8 km) west of Langtry, Texas. Chemical analyses, March 1969 through 1970 and October 1974 through 1981; biochemical, October 1974 through 1981; suspended silt 1969 through 1981; specific conductance, 1969 through 1981.

**REMARKS:** Sampling and analyses by U. S. Geological Survey; sampling and determinations for suspended silt and specific conductance by the International Boundary and Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey.

| 1981<br>Date | Time<br>Std.<br>Sec.-Ft. | Stream-<br>flow,<br>Momen-<br>tary<br>Micromhos | Specific<br>Conduct-<br>ance<br>Units | pH<br>Deg C | Tempera-<br>ture<br>mg/L | Hard-<br>ness,<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Hard-<br>ness,<br>Noncar-<br>bonate<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion<br>(Ca),<br>Dis-<br>solved<br>mg/L | Magnes-<br>ium<br>(Mg)<br>mg/L | Sodium<br>ion<br>(Na),<br>Dis-<br>solved<br>mg/L | Sodium<br>Adso-<br>rtion<br>Ratio<br>(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L |
|--------------|--------------------------|---|---------------------------------------|-------------|--------------------------|---|---|---|--------------------------------|--|--|--|
| Jan. 14      | 1450                     | 1,420   | 1,220                                 | 7.6         | 14.0                     | 300   | 150   | 90  | 18                             | 150  | 3.8  | 4.7  |
| Feb. 11      | 1315                     | 1,770   | 1,220                                 | 7.7         | 3.5                      | 300   | 140   | 91  | 17                             | 150  | 3.8  | 5.3  |
| Mar. 11      | 1430                     | 1,830   | 1,200                                 | 7.4         | 15.0                     | 290   | 120   | 88  | 17                             | 140  | 3.6  | 5.6  |
| Apr. 8       | 1310                     | 1,710   | 1,100                                 | 7.8         | 22.0                     | 270   | 130   | 82  | 17                             | 140  | 3.7  | 6.1  |
| May 6        | 1320                     | 3,360   | 1,380                                 | 7.8         | 25.0                     | 340   | 190   | 110   | 16                             | 160  | 3.8  | 6.5  |
| June 3       | 1320                     | 971   | 1,200                                 | 7.7         | 27.5                     | 290   | 160   | 82  | 20                             | 140  | 3.6  | 5.8  |
| July 8       | 1215                     | 1,110   | 895                                   | 7.8         | 27.0                     | 250   | 120   | 79  | 12                             | 95   | 2.6  | 5.1  |
| Aug. 5       | 1340                     | 1,290   | 806                                   | 7.7         | 31.0                     | 200   | 70  | 65  | 9.2                            | 100  | 3.2  | 4.9  |
| Sep. 9       | 1230                     | 2,080   | 1,080                                 | 7.7         | 27.5                     | 240   | 120   | 77  | 12                             | 120  | 3.5  | 6.8  |
| Oct. 7       | 1440                     | 7,760   | 940                                   | 7.7         | 23.0                     | 260   | 160   | 84  | 13                             | 110  | 3.1  | 5.5  |
| Nov. 2       | 1405                     | 1,110   | 1,270                                 | 7.8         | 15.5                     | 330   | 160   | 96  | 21                             | 160  | 4.1  | 6.4  |

| 1981<br>Date | Alka-<br>linity<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion<br>(SO <sub>4</sub> ),<br>Dis-<br>solved<br>mg/L | Chlo-<br>ride<br>ion (Cl),<br>Dis-<br>solved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dis-<br>solved<br>mg/L | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>Cols./<br>100 mL | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>5 day<br>mg/L | Tur-<br>bidity<br>NTU | Solids,<br>Dis-<br>solved<br>(Calcu-<br>lated)<br>mg/L | Solids,<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Solids,<br>Dis-<br>solved<br>Deg C<br>mg/L | Sus-<br>pended<br>Sedi-<br>ment<br>mg/L |
|--------------|--|---|--|--|---|---|---|-----------------------|--|--|--|---|
| Jan. 14      | 180  | 310   | 99   | 25   | 8.5                                       | 120   | 1.0   | 1.1                   | 793  | 805  | 818  | 137                                     |
| Feb. 11      | 160  | 310   | 92   | 25   | 9.2                                       | 78  | .8  | .64                   | 793  | 785  | 767  | 217                                     |
| Mar. 11      | 170  | 310   | 76   | 26   | 9.0                                       | 74  | 2.2   | .68                   | 772  | 758  | 772  | 141                                     |
| Apr. 8       | 140  | 340   | 69   | 27   | 9.4                                       | 80  | 1.3   | .48                   | 907  | 927  | 2,890                                      | 2,890                                   |
| May 6        | 150  | 390   | 110  | 25   | 8.5                                       | 2,600                                       | 1.2   | .48                   | 768  | 753  | 607  | 126                                     |
| June 3       | 130  | 320   | 99   | 24   | 9.0                                       | 160   | 3.7   | .52                   | 3,300  | 607  | 4,100                                      | 5,280                                   |
| July 8       | 130  | 270   | 49   | 23   | 8.8                                       | 540   | 3.0   | 607                   | 549  | 610  | 541  | 6,860                                   |
| Aug. 5       | 120  | 230   | 40   | 22   | 8.7                                       | 440   | 2.0   | 8,500                 | 679  | 690  | 814  | 11,000                                  |
| Sep. 9       | 120  | 290   | 73   | 23   | 7.8                                       | 4,300                                       | 1.3   | 6,600                 | 645  | 645  | 870  |   |
| Oct. 7       | 100  | 280   | 75   | 17   | 7.9                                       | 4,400                                       | .5  | 60                    | 832  | 832  |  |   |
| Nov. 2       | 170  | 300   | 140  | 23   | 8.2                                       | 400   | .6  |                       |  |  |  |   |

## SUSPENDED SILT - 1981

| Month | Tons          |           | Number<br>of<br>Samples | Gravimetric Percentages |                   |                   | Acre-Feet<br>at 1,452<br>Tons/Ac.Ft. | 1969-1981<br>Period of Record |         |         |
|-------|---------------|-----------|-------------------------|-------------------------|-------------------|-------------------|--------------------------------------|-------------------------------|---------|---------|
|       | Water         | Silt      |                         | Average                 | Maximum<br>Sample | Minimum<br>Sample |                                      | Average                       | Maximum | Minimum |
| Jan.  | 100,613,000   | 11,600    | 30                      | 0.01148                 |                   |                   | 8.0                                  | 5.8                           | 34.9    | 0.61    |
| Feb.  | 116,006,000   | 17,500    | 27                      | .01512                  |                   |                   | 12.1                                 | 4.5                           | 17.8    | .57     |
| Mar.  | 148,230,000   | 8,950     | 30                      | .006040                 |                   |                   | 6.2                                  | 9.6                           | 49.2    | .72     |
| Apr.  | 199,237,000   | 589,000   | 26                      | .2954                   | 1.891             | 0.01420           | 406                                  | 40.7                          | 406     | .22     |
| May   | 141,587,000   | 250,000   | 28                      | .1766                   | .9896             | .01750            | 172                                  | 145                           | 792     | .60     |
| June  | 123,461,000   | 170,000   | 27                      | .1376                   | .6623             | .03730            | 117                                  | 308                           | 1,570   | 21.5    |
| July  | 114,625,000   | 243,000   | 28                      | .2120                   | .8758             | .009100           | 167                                  | 424                           | 875     | 2.1     |
| Aug.  | 222,313,000   | 674,000   | 28                      | .3034                   | 1.702             | .07210            | 464                                  | 624                           | 1,320   | 21.8    |
| Sept. | 440,302,000   | 886,000   | 25                      | .2012                   | 1.027             | .06380            | 610                                  | 792                           | 1,670   | 13.4    |
| Oct.  | 432,765,000   | 1,785,000 | 3                       | .4125                   | .9036             | .3199             | 1,230                                | 432                           | 1,590   | 1.1     |
| Nov.  | 155,380,000   | 27,000    | 5                       | .01740                  |                   |                   | 18.6                                 | 152                           | 1,760   | .76     |
| Dec.  | 130,429,000   | 14,800    | 4                       | .01132                  |                   |                   | 10.2                                 | 8.3                           | 19.6    | .62     |
| Year  | 2,324,946,000 | 4,676,850 | 261                     | 0.2012                  | 1.891             |                   | 3,221.1                              | 2,945.9                       | 7,763.5 | 954.9   |

**QUALITY OF WATER - 1981**

**Rio Grande at Foster Ranch near Langtry, Texas and Rancho Santa Rosa, Coahuila**

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov. | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| 1   | 1,320 | 1,070 | 1,130 | 1,130 | 408   | 1,190 | 1,010 | 1,240 | 1,150 |       |      |       |
| 2   | 1,310 | 1,020 | 1,130 | 1,110 | 264   | 1,180 | 1,260 | 962   | 1,150 |       |      |       |
| 3   | 1,320 | 1,070 | 1,110 | 1,130 | 835   | 1,180 | 933   | 1,140 | 1,170 |       |      |       |
| 4   | 1,310 | 1,100 | 1,120 | 1,080 | 1,070 | 1,230 | 974   | 979   | 1,240 |       |      |       |
| 5   | 1,280 | 1,270 | 1,110 | 1,070 | 1,190 | 1,220 | 1,040 |       | 1,180 |       |      |       |
| 6   | 1,290 | 1,430 | 1,120 | 1,120 | 1,310 | 1,020 | 1,130 | 1,040 | 898   |       |      |       |
| 7   | 1,380 | 1,630 | 1,130 | 1,080 | 1,290 | 1,040 | 1,090 | 1,010 |       |       |      | 1,370 |
| 8   | 1,500 | 1,560 | 1,120 | 1,120 | 413   | 1,110 | 965   | 993   | 1,050 |       |      |       |
| 9   | 1,450 | 1,300 | 1,130 | 1,140 | 680   |       | 1,110 | 709   | 1,070 |       |      |       |
| 10  |       | 1,340 | 1,080 | 1,100 | 718   | 1,110 | 589   | 1,090 | 1,400 |       |      |       |
| 11  | 1,300 |       | 1,140 | 1,090 | 791   | 1,040 |       | 1,150 | 1,150 |       |      |       |
| 12  | 1,220 | 1,190 | 1,140 | 1,130 | 743   | 1,190 | 1,070 | 1,140 | 760   |       |      |       |
| 13  | 1,210 | 1,180 | 1,140 | 1,100 | 985   | 1,010 |       | 582   | 795   | 769   |      |       |
| 14  | 1,200 | 1,180 | 1,090 | 1,010 | 1,000 | 1,030 | 1,110 | 1,060 | 758   |       |      | 1,030 |
| 15  | 1,210 | 1,170 | 1,120 |       | 436   | 997   | 1,150 | 1,100 | 1,090 | 885   |      |       |
| 16  | 1,200 | 1,100 | 1,120 | 1,050 |       | 1,170 | 1,080 | 802   |       |       |      | 960   |
| 17  | 1,200 | 1,160 | 1,120 |       | 1,090 | 911   | 1,100 | 996   | 1,050 |       |      |       |
| 18  | 1,190 | 1,160 | 1,120 |       |       | 1,000 | 1,040 | 912   |       |       |      |       |
| 19  | 1,190 | 1,150 | 1,120 | 1,050 | 1,070 | 1,100 |       | 917   |       | 862   |      |       |
| 20  | 1,140 | 1,160 |       |       | 951   | 1,090 | 1,110 | 949   | 832   | 1,050 |      |       |
| 21  | 1,200 | 1,130 | 1,120 | 934   | 1,170 | 1,090 | 1,100 | 921   | 1,040 |       |      | 1,020 |
| 22  | 1,200 | 1,130 | 1,120 | 948   |       | 1,040 | 1,130 |       |       |       |      | 1,020 |
| 23  | 1,210 | 1,130 | 1,080 | 1,010 | 1,370 | 1,120 | 1,080 | 845   | 1,010 |       |      | 989   |
| 24  | 1,190 | 1,130 | 1,150 |       | 1,360 | 1,110 | 1,190 | 937   | 992   |       |      |       |
| 25  | 1,190 | 1,140 | 1,130 |       |       | 762   | 1,100 | 1,130 | 1,010 | 968   |      |       |
| 26  | 1,190 | 1,130 | 1,090 | 992   | 740   | 1,090 | 1,130 |       | 915   | 921   |      |       |
| 27  | 1,170 | 1,150 | 1,070 | 1,160 | 658   |       | 1,100 | 1,070 | 858   |       |      |       |
| 28  | 1,140 | 1,130 | 1,140 | 1,120 |       | 1,050 | 1,090 | 1,090 | 865   |       |      | 1,020 |
| 29  | 1,120 |       | 1,080 |       | 867   | 1,150 |       | 1,080 | 1,110 |       |      |       |
| 30  | 1,090 |       | 1,120 |       | 663   | 1,150 | 1,090 | 1,110 | 1,120 | 886   |      | 1,230 |
| 31  | 1,080 |       | 1,130 |       |       | 1,140 |       | 855   | 1,130 |       |      |       |

## QUALITY OF WATER - 1981

## Pecos River near Langtry, Texas

**LOCATION:** At gaging station, 15.0 river miles (24.1 km) from the confluence with the Rio Grande, which is located at river mile 616.0 (991.4 km).

**RECORDS:** Chemical analyses, 1967 through 1981; biochemical analyses, October 1974 through 1981; suspended silt.

November 1954 through 1976; specific conductance, 1969 through 1981.

**REMARKS:** Sampling and analyses by U. S. Geological Survey; sampling and determinations for specific conductance by the International Boundary and Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey.

| 1981<br>Date | Time<br>Std. | Stream-<br>flow,<br>Momen-<br>tary<br>Sec.-Ft. | Specific<br>Conduct-<br>ance<br>Micromhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hard-<br>ness,<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Hard-<br>ness,<br>Noncar-<br>bonate<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion<br>(Ca),<br>Dis-<br>solved<br>mg/L | Magne-<br>sium<br>ion<br>(Mg)<br>mg/L | Sodium<br>ion<br>(Na),<br>Dis-<br>solved<br>mg/L | Sodium<br>Adsor-<br>ption<br>Ratio<br>(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L |
|--------------|--------------|--|---|-------------|---------------------------|---|---|---|---------------------------------------|--|---|--|
| Jan. 14      | 1010         | 226  | 5,200                                     | 7.7         | 10.0                      | 1,000   | 860   | 240   | 100                                   | 800  | 11  | 10   |
| Feb. 11      | 0950         | 193  | 4,870                                     | 7.8         | 11.5                      | 930   | 770   | 210   | 98                                    | 750  | 11  | 10   |
| Mar. 11      | 1010         | 215  | 4,860                                     | 7.3         | 14.0                      | 930   | 760   | 210   | 98                                    | 680  | 9.7   | 10   |
| Apr. 8       | 0915         | 173  | 5,470                                     | 7.9         | 20.0                      | 960   | 820   | 220   | 100                                   | 790  | 11  | 11   |
| May 6        | 0815         | 795  | 2,400                                     | 7.7         | 21.0                      | 490   | 310   | 120   | 46                                    | 300  | 5.9   | 6.0  |
| June 3       | 0830         | 403  | 2,600                                     | 7.6         | 25.0                      | 510   | 350   | 120   | 51                                    | 330  | 6.4   | 6.6  |
| July 8       | 0910         | 281  | 2,240                                     | 7.8         | 26.0                      | 470   | 320   | 110   | 47                                    | 310  | 6.2   | 6.0  |
| Aug. 5       | 0930         | 215  | 2,460                                     | 7.7         | 28.0                      | 460   | 320   | 110   | 45                                    | 340  | 6.9   | 6.9  |
| Sep. 9       | 0915         | 247  | 3,080                                     | 7.6         | 27.0                      | 610   | 460   | 140   | 64                                    | 420  | 7.4   | 9.3  |
| Oct. 7       | 1015         | 403  | 3,500                                     | 7.6         | 24.0                      | 700   | 570   | 160   | 73                                    | 490  | 8.1   | 9.5  |
| Nov. 2       | 1010         | 284  | 2,730                                     | 7.6         | 13.0                      | 580   | 400   | 140   | 56                                    | 360  | 6.5   | 7.2  |

| 1981<br>Date | Alka-<br>linity<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion<br>(SO <sub>4</sub> ),<br>Dis-<br>solved<br>mg/L | Chlo-<br>ride<br>ion<br>(Cl),<br>Dis-<br>solved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dis-<br>solved<br>mg/L | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>mg/L | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>5 day<br>mg/L | Tur-<br>bidity<br>NTU | Solids,<br>Dis-<br>solved<br>(Caicu-<br>lated)<br>mg/L | Solids,<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Sus-<br>pended<br>Sedi-<br>ment<br>mg/L |    |
|--------------|--|---|---|--|---|---------------------------------|---|-----------------------|--|--|---|----|
| Jan. 14      | 160  | 790   | 1,300   | 9.8  | 79  | 14                              | 0.4   | 0.4                   | 3,350  | 3,450  | 4                                       | 20 |
| Feb. 11      | 160  | 720   | 1,200   | 12   | 79  | 20                              | .7  | 1.4                   | 3,100  | 3,030  | 120                                     | 17 |
| Mar. 11      | 170  | 660   | 1,200   | 12   | 84  | 34                              | 1.6   | 1.4                   | 2,950  | 3,120  | 430                                     | 11 |
| Apr. 8       | 140  | 790   | 1,300   | 12   | 107                                       | 21                              | 1.5   | 1.0                   | 3,310  | 3,430  | 1,460                                   | 42 |
| May 6        | 170  | 300   | 490   | 15   | 98  | 23                              | .9  | 2.6                   | 1,390  | 1,440  | 1,390                                   | 24 |
| June 3       | 160  | 300   | 520   | 16   | 105                                       | 11                              | 2.5   | .9                    | 1,360  | 1,370  | 1,470                                   | 17 |
| July 8       | 150  | 290   | 490   | 17   | 110                                       | 22                              | 3.4   | 1.0                   | 1,460  | 1,460  | 1,910                                   | 15 |
| Aug. 5       | 140  | 300   | 560   | 17   | 112                                       | 21                              | 1.7   | .7                    | 1,850  | 1,850  | 2,240                                   | 29 |
| Sep. 9       | 150  | 400   | 720   | 17   | 113                                       | 24                              | 1.2   | 3.3                   | 2,170  | 2,170  | 2,240                                   |    |
| Oct. 7       | 130  | 180   | 860   | 14   | 105                                       | 42                              | .8  | 1.6                   | 1,660  | 1,660  | 1,730                                   |    |
| Nov. 2       | 180  | 360   | 640   | 15   | 82  | 14                              | .2  | .5                    |  |  |   |    |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January  | February | April    | June     | July      | September | November |
|----------|----------|----------|----------|-----------|-----------|----------|
| 5 5,730  | 23 4,890 | 13 5,090 | 1 2,220  | 27 2,670  | 21 2,780  | 9 2,480  |
| 12 5,610 | March    | 20 1,990 | 8 3,310  | 28 3,160  | 16 2,560  |          |
| 19 5,070 | 2 4,750  | 27 2,680 | 15 2,380 | 3 2,540   | October   | 23 2,630 |
| 26 4,930 | 9 4,850  | May      | 15 2,380 | 17 2,160  | 5 3,800   | 30 2,780 |
| February | 23 5,850 | 22 2,480 | 22 2,340 | 24 2,380  | 13 397    | December |
| 2 4,910  | 30 5,570 | 11 2,270 | 29 2,340 | 31 2,730  | 19 2,410  | 7 2,880  |
| 9 4,910  | April    | 18 2,260 | 6 2,280  | September | 26 2,290  | 14 3,120 |
| 17 4,870 | 6 5,430  | 26 2,210 | 13 2,370 | 8 3,100   | November  | 21 3,260 |
|          |          |          | 20 2,620 | 14 3,020  | 2 2,380   | 28 3,350 |

## QUALITY OF WATER - 1981

## Devils River at Pafford Crossing near Comstock, Texas

**LOCATION:** At gaging station 25.5 river miles (41.0 km) from the confluence with the Rio Grande, which is located at river mile 574.6 (924.7 km).

**RECORDS:** Specific conductance, 1968 through 1981.

**REMARKS:** Sampling and determinations for specific conductance by the U. S. Geological Survey. Sampling prior to 1978 by the International Boundary and Water Commission. Chemical and biochemical analyses, 1978 through 1981 available from U. S. Geological Survey.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Day | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|------|------|------|------|-----|------|------|------|-------|------|------|------|
| 1   | 389  | 390  | 391  | 409  | 382 | 390  | 356  | 366  | 345   |      |      | 368  |
| 2   | 389  | 387  | 400  | 411  | 286 | 372  | 356  | 366  | 347   |      |      | 371  |
| 3   | 390  | 388  | 407  | 402  | 223 | 361  | 356  | 366  | 346   |      |      | 372  |
| 4   | 389  | 393  | 408  | 404  | 286 | 355  | 358  | 366  | 347   |      |      | 372  |
| 5   | 389  | 393  | 380  | 400  | 320 | 362  | 353  | 366  | 348   |      |      | 370  |
| 6   | 391  | 393  | 367  | 397  | 363 | 366  | 354  | 366  | 347   |      |      | 371  |
| 7   | 391  | 391  | 370  | 382  | 377 | 371  | 358  | 365  | 351   |      |      | 370  |
| 8   | 390  | 388  | 366  | 372  | 383 | 360  | 360  | 363  | 363   |      |      | 369  |
| 9   | 392  | 384  | 374  | 369  | 387 | 356  | 360  | 360  | 361   |      |      | 368  |
| 10  | 392  | 381  | 397  | 369  | 370 | 353  | 360  | 363  | 361   |      |      | 367  |
| 11  | 395  | 381  | 423  | 366  | 370 | 352  | 360  | 363  | 361   |      |      | 364  |
| 12  | 396  | 385  | 381  | 365  | 375 | 352  | 360  | 368  | 361   |      |      | 363  |
| 13  | 396  | 388  | 388  | 366  | 404 | 352  | 360  | 352  | 361   |      |      | 363  |
| 14  | 396  | 390  | 413  | 365  | 396 | 354  | 359  | 352  | 359   |      |      | 362  |
| 15  | 394  | 389  | 406  | 359  | 387 | 373  | 358  | 350  | 357   |      |      | 361  |
| 16  | 393  | 387  | 410  | 371  | 383 | 234  | 359  | 343  | 361   |      |      | 361  |
| 17  | 389  | 384  | 410  | 365  | 384 | 266  | 360  | 348  | 363   |      |      | 358  |
| 18  | 389  | 383  | 414  | 383  | 383 | 325  | 360  | 352  | 363   |      |      | 363  |
| 19  | 394  | 380  | 413  | 369  | 390 | 329  | 360  | 350  | 363   |      |      | 361  |
| 20  | 395  | 376  | 428  | 352  | 369 | 348  | 360  | 351  | 363   |      |      | 361  |
| 21  | 394  | 390  | 425  | 353  | 398 | 350  | 360  | 351  | 363   |      |      | 358  |
| 22  | 392  | 388  | 421  | 371  | 394 | 351  | 360  | 350  | 363   |      |      | 356  |
| 23  | 393  | 398  | 419  | 370  | 395 | 351  | 361  | 348  | 363   |      |      | 356  |
| 24  | 391  | 396  | 419  | 380  | 382 | 353  | 363  | 348  | 363   |      |      | 356  |
| 25  | 389  | 398  | 383  | 377  | 387 | 353  | 363  | 346  | 363   |      |      | 357  |
| 26  | 389  | 397  | 408  | 376  | 401 | 353  | 363  | 346  | 363   |      |      | 357  |
| 27  | 386  | 398  | 410  | 374  | 391 | 354  | 360  | 348  | 363   |      |      | 356  |
| 28  | 386  | 395  | 404  | 375  | 392 | 355  | 361  | 349  | 363   |      |      | 353  |
| 29  | 385  |      |      | 411  | 379 | 396  | 356  | 361  | 346   | 363  |      | 354  |
| 30  | 385  |      |      | 413  | 381 | 392  | 356  | 361  | 352   | 363  |      | 353  |
| 31  | 384  |      |      | 400  | 402 |      |      | 366  | 353   |      |      |      |

## QUALITY OF WATER - 1981

## Rio Grande below Amistad Dam near Cd. Acuna, Coahuila and Del Rio, Texas

**LOCATION:** Gaging station at river mile 571.8 (920.3 km), 2.2 river miles (3.4 km) downstream from Amistad Dam.  
**RECORDS:** Chemical analyses, July 1968 through 1981; suspended silt, 1969 through 1976; specific conductance, 1968 through 1981.

**REMARKS:** Sampling for chemical analyses by the International Boundary and Water Commission, analyses by the U. S. Geological Survey. Sampling and determinations for specific conductance by the International Boundary and Water Commission.

| 1981<br>Date | Time<br>Standard | Streamflow,<br>Momentary<br>Second-Feet | Specific<br>Conductance<br>Micromhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> ) | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> ) | Calcium<br>ion (Ca),<br>Dissolved | Magnesium<br>ion (Mg),<br>Dissolved |
|--------------|------------------|---|--------------------------------------|-------------|---------------------------|---|--|-----------------------------------|-------------------------------------|
|              |                  |   |                                      |             |                           | mg/L  | mg/L   | mg/L                              | mg/L                                |
| Jan. 26      | 1420             | 1,830                                   | 1,010                                | 8.2         | 13.0                      | 260   | 140  | 76                                | 18                                  |
| Feb. 23      | 1515             | 1,640                                   | 1,030                                | 8.2         | 14.0                      | 260   | 130  | 76                                | 18                                  |
| Mar. 18      | 0815             | 1,640                                   | 1,010                                | 8.1         | 16.0                      | 270   | 130  | 76                                | 18                                  |
| Apr. 15      | 0820             | 2,280                                   | 1,020                                | 8.0         | 18.0                      | 270   | 140  | 78                                | 18                                  |
| May 20       | 0625             | 692                                     | 1,030                                | 8.0         | 21.0                      | 270   | 140  | 78                                | 18                                  |
| June 22      | 1136             | 3,110                                   | 1,030                                | 8.2         | 24.5                      | 260   | 120  | 78                                | 17                                  |
| July 15      | 0615             | 2,370                                   | 1,050                                | 7.9         | 26.0                      | 270   | 150  | 76                                | 19                                  |
| Aug. 19      | 0620             | 7,130                                   | 1,030                                | 7.9         | 26.0                      | 260   | 140  | 72                                | 19                                  |
| Sep. 16      | 0620             | 8,400                                   | 1,050                                | 8.0         | 25.5                      | 240   | 130  | 68                                | 18                                  |
| Oct. 21      | 0722             | 7,630                                   | 1,020                                | 8.2         | 21.5                      | 260   | 140  | 73                                | 18                                  |
| Nov. 18      | 0815             | 1,870                                   | 1,050                                | 8.0         | 18.5                      | 260   | 140  | 76                                | 18                                  |
| Dec. 17      | 0820             | 1,760                                   | 1,010                                | 8.0         | 18.5                      | 260   | 140  | 76                                | 18                                  |

| 1981<br>Date | Sodium<br>ion (Na),<br>Dissolved | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> ) | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved | Chloride<br>ion (Cl),<br>Dissolved | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved | Solids<br>Dissolved<br>(Calculated) |      |
|--------------|----------------------------------|------------------------------------|------------------------------------|--|---|------------------------------------|---|-------------------------------------|------|
|              |                                  |                                    |                                    |  |   |                                    |   | mg/L                                | mg/L |
| Jan. 26      | 110                              | 2.9                                | 4.7                                | 120  | 240   | 110                                | 17  | 648                                 |      |
| Feb. 23      | 110                              | 2.9                                | 4.6                                | 130  | 230   | 110                                | 16  | 643                                 |      |
| Mar. 18      | 100                              | 2.7                                | 4.8                                | 120  | 240   | 110                                | 16  | 628                                 |      |
| Apr. 15      | 110                              | 2.9                                | 4.7                                | 130  | 230   | 110                                | 16  | 645                                 |      |
| May 20       | 110                              | 2.9                                | 4.7                                | 130  | 230   | 110                                | 16  | 645                                 |      |
| June 22      | 110                              | 2.9                                | 4.5                                | 140  | 220   | 110                                | 17  | 641                                 |      |
| July 15      | 120                              | 3.4                                | 4.8                                | 120  | 230   | 120                                | 17  | 659                                 |      |
| Aug. 19      | 120                              | 3.5                                | 5.1                                | 120  | 240   | 120                                | 17  | 665                                 |      |
| Sep. 16      | 120                              | 3.6                                | 5.0                                | 110  | 230   | 130                                | 17  | 654                                 |      |
| Oct. 21      | 110                              | 3.2                                | 4.9                                | 120  | 220   | 110                                | 17  | 625                                 |      |
| Nov. 18      | 110                              | 3.1                                | 5.2                                | 120  | 240   | 110                                | 18  | 649                                 |      |
| Dec. 17      | 110                              | 3.1                                | 4.9                                | 120  | 220   | 110                                | 18  | 629                                 |      |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January  | February | April    | June     | August    | September | November |
|----------|----------|----------|----------|-----------|-----------|----------|
| 2 1,030  | 27 1,050 | 20 1,040 | 12 1,050 | 3 1,040   | 23 1,050  | 9 1,030  |
| 5 992    | March    | 22 1,050 | 15 1,060 | 5 1,030   | 25 1,050  | 12 1,030 |
| 7 990    | 2 990    | 24 1,030 | 17 1,020 | 7 1,040   | 28 1,050  | 13 1,040 |
| 9 1,030  | 4 987    | 27 1,030 | 19 1,030 | 10 1,040  | 30 1,060  | 16 1,010 |
| 12 1,010 | 6 1,010  | 29 1,040 | 22 1,040 | 12 1,040  | October   | 18 1,040 |
| 14 1,020 | 9 1,000  | May      | 24 1,040 | 14 1,040  | 2 1,050   | 20 997   |
| 16 1,020 | 11 1,020 | 1 1,040  | 26 1,040 | 17 1,040  | 5 1,050   | 23 1,020 |
| 19 1,030 | 13 1,020 | 4 1,060  | 29 1,040 | 19 1,030  | 7 1,050   | 25 1,020 |
| 21 1,030 | 16 1,020 | 6 1,040  | July     | 21 1,030  | 9 1,040   | 27 1,000 |
| 23 1,020 | 18 1,010 | 8 1,070  | 1 1,050  | 24 1,020  | 13 1,030  | 30 1,020 |
| 26 1,020 | 20 1,030 | 13 1,040 | 2 1,040  | 26 1,040  | 14 1,030  | December |
| 28 989   | 23 1,040 | 15 1,030 | 6 1,030  | 28 1,040  | 16 1,020  | 2 998    |
| 30 1,020 | 25 1,030 | 18 1,040 | 8 1,040  | 31 1,040  | 19 1,020  | 4 1,000  |
| February | 27 1,040 | 20 1,030 | 10 1,020 | September | 21 1,020  | 7 1,020  |
| 2 1,010  | 30 1,020 | 22 1,050 | 13 1,020 | 2 1,040   | 23 1,040  | 9 1,010  |
| 4 1,030  | April    | 26 1,040 | 15 1,030 | 4 1,040   | 26 1,030  | 11 1,020 |
| 6 1,030  | 1 1,030  | 27 1,040 | 17 1,030 | 8 1,040   | 28 1,040  | 14 1,020 |
| 9 1,030  | 3 1,060  | 29 1,060 | 20 1,020 | 9 1,040   | 30 1,050  | 16 1,000 |
| 11 1,050 | 6 1,030  | June     | 22 1,040 | 11 1,040  | November  | 18 1,010 |
| 13 1,050 | 8 1,040  | 1 1,030  | 24 1,050 | 14 1,040  | 2 1,040   | 21 1,010 |
| 17 1,020 | 10 1,040 | 3 1,050  | 27 1,040 | 16 1,050  | 4 1,040   | 23 1,010 |
| 23 1,030 | 13 1,050 | 5 1,030  | 29 1,040 | 18 1,040  | 6 1,040   | 28 1,020 |
| 25 1,040 | 15 1,020 | 8 1,040  | 31 1,040 | 21 1,040  | 30 1,010  |          |

**QUALITY OF WATER - 1981****Rio Grande near Jimenez, Coahuila and Quemado, Texas**

**LOCATION:** Near gaging station at Maverick Canal Headgates. The canal intake is at river mile 543.6 (874.9 km), 13.3 river miles (21.5 km) above the gaging station.

**RECORDS:** Specific conductance, 1954 through 1981.

**REMARKS:** Sampling and determinations by the International Boundary and Water Commission.

**SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981**

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 986   | 1,020 | 1,020 | 1,010 | 983   | 1,010 | 1,020 | 983   | 1,020 | 1,060 | 1,040 | 987   |
| 2   | 983   | 986   | 999   | 1,010 | 937   | 972   | 1,020 | 985   | 1,000 | 1,030 | 1,020 | 968   |
| 3   | 982   | 991   | 984   | 1,020 | 854   | 977   | 1,020 | 989   | 1,000 | 1,020 | 1,020 | 976   |
| 4   | 985   | 1,000 | 1,030 | 1,040 | 959   | 986   | 1,020 | 990   | 1,030 | 1,020 | 1,020 | 980   |
| 5   | 981   | 1,010 | 997   | 1,010 | 977   | 887   | 1,020 | 993   | 1,040 | 1,020 | 1,020 | 987   |
| 6   | 979   | 1,010 | 1,000 | 1,010 | 985   | 1,010 | 1,020 | 964   | 1,010 | 1,020 | 1,020 | 1,000 |
| 7   | 985   | 1,010 | 1,010 | 1,020 | 978   | 1,000 | 1,020 | 1,010 | 1,030 | 458   | 1,010 | 991   |
| 8   |       | 1,010 | 1,010 | 1,020 | 976   | 1,000 | 1,020 | 1,010 | 1,030 | 947   | 1,040 | 992   |
| 9   | 989   | 1,010 | 1,010 | 1,020 | 981   | 1,010 | 1,030 | 1,010 | 1,020 | 1,000 | 1,020 | 990   |
| 10  |       | 1,010 | 1,010 | 1,020 | 988   | 1,010 | 1,020 | 1,000 | 1,020 | 1,010 | 1,010 | 992   |
| 11  |       | 1,020 | 1,020 | 1,030 | 989   | 1,020 | 1,010 | 1,010 | 1,030 | 1,010 | 1,010 | 993   |
| 12  | 1,000 | 993   | 995   | 1,060 | 967   | 1,020 | 1,010 | 1,010 | 1,040 | 1,050 | 1,010 | 998   |
| 13  | 996   | 1,030 | 995   | 1,040 | 968   | 1,020 | 1,020 | 1,020 | 1,030 | 1,010 | 1,010 | 997   |
| 14  | 997   | 1,030 | 999   | 1,030 | 975   | 1,020 | 1,020 | 1,010 | 1,030 | 1,030 | 1,020 | 982   |
| 15  | 1,000 | 1,020 | 1,000 | 1,020 | 983   | 1,020 | 1,020 | 1,030 | 1,040 | 1,030 | 1,020 | 999   |
| 16  | 994   | 1,020 | 1,020 | 987   | 979   | 763   | 1,020 | 1,030 | 1,030 | 1,020 | 1,020 | 975   |
| 17  | 998   | 1,020 | 999   | 1,010 | 1,010 | 892   | 1,020 | 1,020 | 1,040 | 1,010 | 990   | 985   |
| 18  | 988   | 1,020 | 996   | 725   | 991   | 984   | 1,020 | 1,050 | 1,020 | 1,020 | 998   | 993   |
| 19  | 997   | 1,020 | 999   | 927   | 982   | 1,000 | 1,020 | 1,030 | 1,040 | 1,020 | 1,020 | 991   |
| 20  | 1,010 | 1,020 | 997   | 1,020 | 973   | 1,010 | 1,020 | 1,030 | 1,040 | 1,020 | 1,010 | 1,000 |
| 21  | 1,010 | 1,020 | 1,010 | 1,020 | 965   | 1,020 | 1,020 | 1,030 | 1,040 | 1,020 | 1,000 | 990   |
| 22  | 1,000 | 1,030 | 1,020 | 1,030 | 969   | 1,020 | 1,020 | 1,030 | 1,040 | 1,010 | 992   | 986   |
| 23  | 999   | 1,010 | 1,010 | 1,020 | 974   | 1,020 | 1,010 | 1,030 | 1,040 | 1,040 | 1,000 | 986   |
| 24  | 999   | 1,020 | 1,010 | 665   | 968   | 1,020 | 1,010 | 1,030 | 1,050 | 1,050 | 999   | 981   |
| 25  | 1,000 | 1,010 | 1,010 | 949   | 975   | 1,020 | 1,010 | 1,020 | 1,040 | 1,030 | 1,000 | 976   |
| 26  | 1,000 | 1,020 | 1,010 | 996   | 959   | 1,020 | 1,010 | 1,030 | 1,040 | 1,030 | 999   | 973   |
| 27  | 998   | 1,020 | 1,010 | 1,020 | 955   | 1,010 | 1,000 | 1,030 | 1,040 | 1,030 | 1,000 | 976   |
| 28  | 998   | 1,030 | 1,020 | 1,030 | 959   | 1,020 | 1,010 | 1,030 | 1,040 | 1,020 | 986   | 974   |
| 29  | 999   |       | 1,010 | 1,040 | 975   | 1,030 | 1,010 | 1,020 | 1,040 | 1,020 | 1,010 | 978   |
| 30  | 1,010 |       | 992   | 1,010 | 975   | 1,020 | 1,010 | 1,030 | 1,050 | 1,030 | 1,000 | 978   |
| 31  | 997   |       | 995   |       | 969   |       | 1,010 | 1,020 |       | 1,030 |       | 981   |

**Rio Grande near El Indio, Texas and Villa Guerrero, Coahuila**

**LOCATION:** Gaging station at river mile 460.4 (741.0 km), 35.9 river miles (57.8 km) downstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila.

**RECORDS:** Specific conductance 1954 through 1981.

**REMARKS:** Sampling and determinations by the International Boundary and Water Commission.

**SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981**

| January  | February | April   | June   | July   | September | November |
|----------|----------|---------|--------|--------|-----------|----------|
| 14 962   | 18 996   | 7 1,070 | 2 782  | 22 922 | 2 987     | 3 929    |
| 28 952   | March    | 21 869  | 18 721 | August | 15 976    | 17 950   |
| February | 3 1,020  | May     | July   | 5 924  | October   | December |
| 4 915    | 18 978   | 5 772   | 8 953  | 19 930 | 6 991     | 2 953    |
|          | 19 783   |         |        | 21 998 |           | 15 996   |

## QUALITY OF WATER - 1981

## Rio Grande at Nuevo Laredo, Tamaulipas and Laredo, Texas

**LOCATION:** Samples for biochemical analyses, specific conductance, and suspended silt collected at the Laredo Water Plant, river mile 364.0 (585.8 km); for chemical and biochemical analyses at International Bridge II, river mile 360.6 (580.3 km).

**RECORDS:** Chemical analyses, 1955 through 1976; chemical and biochemical analyses, 1973 through 1981; biochemical analyses, September 1968 through 1981; suspended silt, 1953 through 1981; specific conductance, 1948-1949 and 1955 through 1981.

**REMARKS:** Samples for chemical and biochemical analyses collected and analyzed by the U. S. Geological Survey; sampling and determinations for suspended silt and specific conductance by the International Boundary and Water Commission and the Texas Department of Water Resources. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey.

| 1981<br>Date | Time<br>Std.<br>Sec.-Ft. | Stream-<br>flow,<br>Momen-<br>tary<br>Micromhos | Specific<br>Conduct-<br>ance<br>pH<br>Units | Temper-<br>ature<br>Deg C | Hard-<br>ness,<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Hard-<br>ness,<br>Noncar-<br>bonate<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion<br>(Ca),<br>Dis-<br>solved<br>mg/L | Magne-<br>sium<br>ion<br>(Mg)<br>mg/L | Sodium<br>ion<br>(Na),<br>Dis-<br>solved<br>mg/L | Sodium<br>Adso-<br>rtion<br>Ratio<br>(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L |
|--------------|--------------------------|---|---|---------------------------|---|---|---|---------------------------------------|--|--|--|
| Jan. 14      | 1130                     | 2,590   | 888   | 8.3                       | 12.5  | 260   | 120   | 79                                    | 16   | 87   | 2.3  |
| Feb. 17      | 1820                     | 2,110   | 990   | 8.2                       | 14.0  | 290   | 150   | 83                                    | 19   | 99   | 2.6  |
| Mar. 17      | 0900                     | 2,190   | 941   | 8.0                       | 17.0  | 270   | 130   | 81                                    | 17   | 94   | 2.5  |
| Apr. 7       | 0815                     | 2,040   | 979   | 8.3                       | 20.5  | 280   | 150   | 81                                    | 19   | 100  | 2.6  |
| May 12       | 0715                     | 3,250   | 713   | 8.1                       | 23.5  | 250   | 130   | 75                                    | 14   | 54   | 1.5  |
| June 16      | 0800                     | 3,850   | 595   | 7.6                       | 27.0  | 180   | 83  | 55                                    | 11   | 52   | 1.7  |
| July 14      | 0750                     | 3,130   | 915   | 7.9                       | 29.0  | 260   | 140   | 74                                    | 18   | 90   | 2.4  |
| Aug. 14      | 0840                     | 2,030   | 870   | 7.8                       | 29.0  | 250   | 120   | 74                                    | 16   | 86   | 2.5  |
| Sep. 15      | 0745                     | 4,800   | 955   | 7.9                       | 28.0  | 250   | 130   | 72                                    | 18   | 100  | 2.9  |
| Oct. 21      | 0925                     | 7,700   | 1,000                                       | 8.4                       | 22.5  | 260   | 130   | 75                                    | 17   | 100  | 2.9  |
| Nov.         |                          |   |   |                           |   |   |   |                                       |  |  |  |
| Dec. 1       | 1030                     | 2,530   | 927   | 8.3                       | 18.5  | 260   | 120   | 76                                    | 17   | 92   | 2.6  |
|              |                          |   |   |                           |   |   |   |                                       |  |  | 3.9  |

| 1981<br>Date | Alka-<br>linity<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion<br>(SO <sub>4</sub> ),<br>Dis-<br>solved<br>mg/L | Chlo-<br>ride<br>ion<br>(Cl),<br>Dis-<br>solved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dis-<br>solved<br>mg/L | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>mg/L | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>Cols./<br>100 mL | Tur-<br>bidity<br>NTU | Solids,<br>Dis-<br>solved<br>(Calcu-<br>lated)<br>mg/L | Solids<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Sus-<br>pended<br>Sedi-<br>ment<br>mg/L |
|--------------|--|---|---|--|---|---------------------------------|--|-----------------------|--|---|---|
| Jan. 14      | 140  | 200   | 78  | 12   | 10.3                                      | 1,000                           | 0.9  | 0.8                   | 564  | 559   | 42                                      |
| Feb. 17      | 140  | 230   | 100   | 13   | 10.6                                      | 2,400                           | .9   | 4.9                   | 630  | 608   | 47                                      |
| Mar. 17      | 89   | 220   | 100   | 15   | 8.0                                       | 550                             | 1.0  | 32                    | 588  | 613   | 87                                      |
| Apr. 7       | 130  | 210   | 100   | 13   | 8.1                                       | 310                             | .4   | 31                    | 608  | 622   | 106                                     |
| May 12       | 120  | 130   | 60  | 13   | 7.6                                       | 560                             | 1.4  | 24                    | 437  | 453   | 92                                      |
| June 16      | 100  | 110   | 54  | 12   | 6.8                                       | 2,000                           | 1.7  | 170                   | 361  | 363   | 200                                     |
| July 14      | 120  | 200   | 100   | 16   | 7.0                                       | 320                             | 1.0  | 32                    | 571  | 584   | 99                                      |
| Aug. 14      | 130  | 180   | 87  | 17   | 6.5                                       | 2,300                           | 1.2  | 30                    | 543  | 544   | 77                                      |
| Sep. 15      | 120  | 210   | 110   | 17   | 6.9                                       | 400                             | .4   | 2.1                   | 605  | 599   | 93                                      |
| Oct. 21      | 130  | 220   | 100   | 17   | 8.3                                       | 740                             | 1.3  | 25                    | 607  | 631   |   |
| Nov.         |  |   |   |  |   |                                 |  |                       |  |   |   |
| Dec. 1       | 140  | 200   | 96  | 14   | 8.8                                       | 1,500                           | 1.7  | 5.0                   | 578  | 600   |   |

| 1981<br>Date | Time<br>Std.<br>Sec.-Ft. | Stream-<br>flow,<br>Momen-<br>tary<br>Micro-<br>mhos | Specific<br>Conduct-<br>ance<br>pH<br>Units | Tem-<br>perature<br>Deg C | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>mg/L | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>5 Day<br>mg/L | Alkalinity<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion<br>(SO <sub>4</sub> ),<br>Dis-<br>solved<br>mg/L | Chloride<br>ion<br>(Cl),<br>Dis-<br>solved<br>mg/L | Solids,<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Sus-<br>pended<br>Sedi-<br>ment<br>mg/L |    |
|--------------|--------------------------|--|---|---------------------------|---|---------------------------------|---|---|---|--|--|---|----|
| Jan. 20      | 0920                     | 2,210  | 895   | 8.3                       | 7.0                                       | 11.4                            | 20  | 1.0   | 142   | 208  | 95   | 520                                     | 11 |
| Feb. 10      | 0915                     | 2,470  | 950   | 8.5                       | 16.0                                      | 10.1                            | 5   | .5  | 142   | 210  | 90   | 570                                     | 10 |
| Mar. 10      | 0820                     | 1,920  | 1,060                                       | 8.0                       | 16.8                                      | 8.6                             | 10  |   | 142   | 219  | 103  |   | 36 |
| Apr. 14      | 0910                     | 2,000  | 1,010                                       | 8.1                       | 24.0                                      | 8.1                             | 10  | 1.0   | 132   | 218  | 105  | 670                                     | 43 |
| May 13       | 0800                     | 3,000  | 730   | 8.0                       | 23.9                                      | 8.0                             | 100   |   | 146   | 130  | 60   | 466                                     | 77 |
| June 9       | 0710                     | 3,240  | 960   | 8.0                       | 29.7                                      | 6.6                             | 150   |   | 152   | 165  | 76   |   | 98 |
| July 14      | 0805                     | 3,130  | 940   | 8.9                       | 28.0                                      | 6.5                             | 65  |   | 124   | 196  | 96   | 630                                     | 58 |
| Aug. 17      | 0810                     | 2,050  | 950   | 9.0                       | 28.5                                      | 7.1                             | 40  | 1.0   | 124   | 200  | 97   | 590                                     | 39 |
| Sep. 14      | 1405                     | 4,840  | 1,000                                       | 8.1                       | 30.4                                      | 7.4                             | 63  |   | 118   | 200  | 102  |   | 11 |
| Oct. 20      | 0800                     | 7,560  | 980   | 7.8                       | 21.5                                      | 8.7                             | 150   | 1.0   | 130   | 215  | 104  | 600                                     | 53 |
| Nov. 17      | 0910                     | 2,530  | 940   | 8.4                       | 19.0                                      | 9.5                             | 12  | 1.0   | 136   | 205  | 98   | 620                                     | 20 |

## QUALITY OF WATER - 1981

## Rio Grande at Nuevo Laredo, Tamaulipas and Laredo, Texas

## SUSPENDED SILT - 1981

| Month | Tons          |         | Number of Samples | Gravimetric Percentages |                |                | Acre-Feet at 1,452 Tons/Ac.Ft. | 1968-1981 Period of Record |         |         |  |
|-------|---------------|---------|-------------------|-------------------------|----------------|----------------|--------------------------------|----------------------------|---------|---------|--|
|       | Water         | Silt    |                   | Average                 | Maximum Sample | Minimum Sample |                                | Average                    | Maximum | Minimum |  |
|       |               |         |                   |                         |                |                |                                |                            |         |         |  |
| Jan.  | 218,065,000   | 4,540   | 31                | 0.002080                |                |                | 3.1                            | 4.4                        | 11.0    | 0.93    |  |
| Feb.  | 171,935,000   | 5,160   | 28                | .003000                 |                |                | 3.6                            | 13.0                       | 109     | .88     |  |
| Mar.  | 166,471,000   | 10,600  | 31                | .003630                 |                |                | 12.2                           | 62.7                       | 1.8     |         |  |
| Apr.  | 467,614,000   | 66,400  | 30                | .01420                  | 0.07920        | 0.007400       | 45.7                           | 34.9                       | 251     | 1.2     |  |
| May   | 327,933,000   | 45,300  | 31                | .01380                  | .04210         | .008500        | 31.2                           | 54.0                       | 165     | 22.5    |  |
| June  | 426,452,000   | 68,400  | 30                | .01604                  | .06120         | .004500        | 47.1                           | 75.3                       | 688     | .56     |  |
| July  | 271,757,000   | 16,700  | 30                | .006160                 |                |                | 11.5                           | 72.4                       | 418     | 1.3     |  |
| Aug.  | 251,715,000   | 18,200  | 31                | .006960                 |                |                | 12.5                           | 63.3                       | 313     | 2.3     |  |
| Sept. | 490,738,000   | 54,000  | 30                | .01100                  | .06440         | .006200        | 37.2                           | 86.4                       | 700     | 9.0     |  |
| Oct.  | 548,351,000   | 35,100  | 31                | .006400                 |                |                | 24.2                           | 61.3                       | 286     | 1.7     |  |
| Nov.  | 203,663,000   | 2,440   | 30                | .001200                 |                |                | 1.7                            | 7.6                        | 27.3    | 1.6     |  |
| Dec.  | 188,461,000   | 2,340   | 31                | .001240                 |                |                | 1.6                            | 5.5                        | 15.2    | .83     |  |
| Year  | 3,743,155,000 | 329,180 | 364               | 0.008794                | 0.07920        |                | 226.7                          | 490.3                      | 1,626.9 | 124.0   |  |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec. |
|-----|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|
| 1   | 872   | 919   | 1,010 | 990   | 847   | 765  | 942   | 947   | 1,010 | 1,010 | 1,030 | 961  |
| 2   | 888   | 932   | 1,010 | 997   | 807   | 774  | 925   | 936   | 961   | 1,010 | 1,040 | 969  |
| 3   | 886   | 946   | 1,030 | 1,000 | 688   | 757  | 932   | 923   | 752   | 999   | 1,010 | 975  |
| 4   | 897   | 951   | 1,020 | 1,000 | 676   | 712  | 911   | 931   | 504   | 1,040 | 988   | 976  |
| 5   | 886   | 954   | 1,030 | 1,010 | 720   | 698  | 920   | 944   | 858   | 1,050 | 976   | 976  |
| 6   | 888   | 953   | 1,020 | 1,010 | 737   | 819  | 913   | 955   | 948   | 1,060 | 965   | 978  |
| 7   | 872   | 950   | 1,000 | 995   | 1,010 | 735  | 851   | 901   | 950   | 923   | 958   | 961  |
| 8   | 893   | 958   | 1,000 | 1,020 | 732   | 892  | 719   | 939   | 975   | 793   | 957   | 978  |
| 9   | 891   | 945   | 986   | 1,020 | 765   | 759  | 866   | 913   | 988   | 912   | 955   | 978  |
| 10  | 899   | 938   | 981   | 1,020 | 702   | 818  | 926   | 892   | 982   | 1,010 | 952   | 970  |
| 11  | 908   | 934   | 996   | 1,030 | 591   | 908  | 932   | 865   | 1,000 | 886   | 949   | 972  |
| 12  | 909   | 956   | 1,000 | 1,020 | 718   | 898  | 925   | 875   | 1,000 | 707   | 958   | 975  |
| 13  | 919   | 969   | 1,040 | 1,020 | 719   | 876  | 939   | 843   | 973   | 612   | 945   | 979  |
| 14  | 910   | 972   | 1,020 | 1,020 | 729   | 711  | 948   | 879   | 945   | 788   | 937   | 984  |
| 15  | 885   | 978   | 1,030 | 945   | 696   | 475  | 948   | 880   | 978   | 983   | 968   | 979  |
| 16  | 926   | 984   | 987   | 329   | 725   | 596  | 913   | 923   | 985   | 995   | 949   | 979  |
| 17  | 907   | 991   | 857   | 789   | 756   | 649  | 922   | 914   | 987   | 1,010 | 957   | 973  |
| 18  | 938   | 994   | 973   | 718   | 732   | 628  | 916   | 929   | 1,000 | 1,010 | 971   | 979  |
| 19  | 944   | 964   | 942   | 913   | 742   | 634  | 908   | 1,020 | 1,020 | 1,020 | 978   | 988  |
| 20  | 941   | 967   | 971   | 850   | 708   | 635  | 933   | 896   | 1,020 | 1,010 | 968   | 983  |
| 21  | 922   | 997   | 987   | 815   | 716   | 783  | 936   | 939   | 1,020 | 1,010 | 979   | 968  |
| 22  | 946   | 985   | 973   | 714   | 752   | 844  | 887   | 978   | 1,010 | 1,000 | 982   | 956  |
| 23  | 1,020 | 996   | 994   | 805   | 771   | 900  | 918   | 997   | 1,010 | 988   | 969   | 972  |
| 24  | 987   | 1,010 | 986   | 835   | 786   | 940  | 926   | 1,010 | 1,010 | 989   | 952   | 968  |
| 25  | 930   | 998   | 975   | 618   | 779   | 943  | 937   | 888   | 1,010 | 989   | 973   | 976  |
| 26  | 941   | 1,000 | 996   | 617   | 748   | 937  | 936   | 1,010 | 1,020 | 853   | 971   | 979  |
| 27  | 912   | 1,000 | 987   | 643   | 690   | 878  | 948   | 1,010 | 1,020 | 1,020 | 957   | 976  |
| 28  | 930   | 1,010 | 986   | 697   | 782   | 911  | 951   | 1,030 | 1,020 | 1,000 | 955   | 979  |
| 29  | 928   | 997   | 772   | 805   | 945   | 944  | 1,040 | 1,010 | 1,010 | 962   | 990   |      |
| 30  | 926   | 984   | 817   | 806   | 946   | 954  | 1,020 | 1,020 | 1,020 | 969   | 1,000 |      |
| 31  | 920   | 992   |       |       | 777   | 943  | 1,000 |       | 1,030 |       | 991   |      |

## QUALITY OF WATER - 1981

## Rio Salado near Las Tortillas, Tamaulipas

LOCATION: At gaging station 24.8 river miles (39.9 km) from the confluence with the Rio Grande, which is located at river mile 299.5 (482.0 km).

RECORDS: Chemical analyses, 1935 through 1981.

REMARKS: Sampling by the International Boundary and Water Commission and analyses by the U. S. Geological Survey.

| 1981<br>Date | Time<br>Standard | Streamflow,<br>Momentary<br>Second-Feet | Specific<br>Conductance<br>Micromhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|---|--------------------------------------|-------------|---------------------------|---|--|---|---|
| Jan. 5       | 1130             | 43.8                                    | 4,140                                | 8.0         | 14.0                      | 1,500   | 1,300  | 340                                       | 150   |
| Feb. 2       | 1130             | 238                                     | 3,460                                | 8.0         | 1200                      | 1,000   | 290  | 110                                       | 110   |
| Mar. 3       | 1115             | 176                                     | 2,180                                | 7.9         | 21.0                      | 740   | 570  | 190                                       | 64  |
| Apr. 1       | 1130             | 97.1                                    | 3,370                                | 8.0         | 25.0                      | 1,100   | 950  | 270                                       | 100   |
| May 7        | 1030             | 13,400                                  | 611                                  | 7.9         | 26.0                      | 230   | 96   | 69  | 13  |
| June 8       | 1400             | 622                                     | 1,150                                | 7.7         | 31.0                      | 390   | 240  | 110                                       | 29  |
| July 3       | 1230             | 2,200                                   | 1,150                                | 7.9         | 29.0                      | 380   | 240  | 103                                       | 30  |
| Aug. 4       | 1015             | 292                                     | 2,880                                | 7.8         | 29.0                      | 970   | 740  | 240                                       | 90  |
| Sep. 2       | 1020             | 301                                     | 2,470                                | 7.9         | 30.0                      | 760   | 610  | 190                                       | 69  |
| Oct. 1       | 1030             | 149                                     | 3,870                                | 7.9         | 28.0                      | 1,400   | 1,300  | 340                                       | 140   |
| Nov. 9       | 1030             | 138                                     | 3,510                                | 7.8         | 20.0                      | 1,200   | 1,000  | 290                                       | 110   |
| Dec. 4       | 1100             | 133                                     | 3,630                                | 7.9         | 18.0                      | 1,200   | 1,100  | 290                                       | 120   |

| 1981<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> <sup>2-</sup> ),<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|--|--|---|--|---|---|
| Jan. 5       | 500                                      | 5.7                                | 3.2  | 180  | 1,600   | 440  | 28  | 3,170                                       |
| Feb. 2       | 390                                      | 4.9                                | 3.2  | 170  | 1,300   | 360  | 59  | 2,610                                       |
| Mar. 3       | 220                                      | 3.5                                | 3.1  | 170  | 720   | 220  | 24  | 1,540                                       |
| Apr. 1       | 400                                      | 5.3                                | 3.8  | 140  | 1,300   | 390  | 21  | 2,570                                       |
| May 7        | 35                                       | 1.0                                | 3.6  | 130  | 120   | 39   | 35  | 393   |
| June 8       | 95                                       | 2.1                                | 2.6  | 150  | 300   | 95   | 21  | 743   |
| July 3       | 96                                       | 2.3                                | 2.8  | 140  | 320   | 94   | 33  | 763   |
| Aug. 4       | 310                                      | 4.3                                | 3.9  | 230  | 990   | 260  | 58  | 2,090                                       |
| Sep. 2       | 260                                      | 4.1                                | 4.5  | 150  | 790   | 280  | 44  | 1,730                                       |
| Oct. 1       | 410                                      | 4.7                                | 3.9  | 160  | 1,500   | 430  | 47  | 2,970                                       |
| Nov. 9       | 390                                      | 4.9                                | 3.5  | 170  | 1,400   | 340  | 22  | 2,660                                       |
| Dec. 4       | 410                                      | 5.1                                | 3.2  | 160  | 1,400   | 360  | 36  | 2,720                                       |

QUALITY OF WATER - 1981

Rio Grande below Falcon Dam near Falcon, Texas and Nueva Cd. Guerrero, Tamaulipas

**Rio Grande below Falcon Dam near Falcon, Colorado**  
LOCATION: Chemical sampling at the Falcon Village Water Plant, river mile 274.8 (442.3 km) and biochemical sampling at the Chapeno gaging station 2.5 river miles (4.1 km) below Falcon Dam; latitude 26°31'55", longitude 99°09'30".  
PERIOD: 1981; biochemical analyses, July 1975 through 1981; suspended

RECORDS: Chemical analyses, July 1955 through 1981; biochemical analyses, July 1975 through 1981; suspended sampling; longitude 99°09'30".

RECORDS: Chemical analyses, July 1955 through 1981; biochemical analyses by the International Boundary and Water Commission, July 1955 through 1976; specific conductance 1955 through 1981.  
REMARKS: Sampling for chemical analyses by the International Boundary and Water Commission, analyses by the U. S. Geological Survey; sampling and determinations for specific conductance by the International Boundary and Water Commission; biochemical analyses, collected and analyzed by the International Boundary and Water Commission and the Texas Department of Water Resources.

| Date    | Standard | Streamflow,<br>Momentary | Specific<br>Conductance | pH<br>Micromhos | Temperature<br>Units | Hardness,<br>Total<br>(as CaCO <sub>3</sub> ) | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> ) | Calcium<br>ion (Ca),<br>Dissolved | Magnesium<br>ion (Mg),<br>Dissolved |
|---------|----------|--------------------------|-------------------------|-----------------|----------------------|---|--|-----------------------------------|-------------------------------------|
|         |          | Second-Feet              | Deg C                   |                 |                      | mg/L  | mg/L   | mg/L                              | mg/L                                |
| Jan. 26 | 1530     | 194                      | 1,020                   | 7.9             | 12.0                 | 260   | 160  | 70                                | 20                                  |
| Feb. 17 | 1040     | 2,040                    | 1,020                   | 8.0             | 12.0                 | 270   | 160  | 72                                | 21                                  |
| Mar. 17 | 1050     | 267                      | 1,010                   | 7.7             | 14.5                 | 260   | 140  | 72                                | 20                                  |
| Apr. 14 | 0950     | 3,570                    | 1,020                   | 7.9             | 20.0                 | 270   | 160  | 73                                | 21                                  |
| May 18  | 0800     | 1 <sup>4</sup> ,200      | 1,010                   | 7.6             | 23.5                 | 260   | 150  | 73                                | 20                                  |
| June 15 | 1015     | 6,520                    | 965                     | 7.5             | 24.5                 | 240   | 130  | 68                                | 18                                  |
| July 13 | 0810     | 11,700                   | 868                     | 7.7             | 26.5                 | 230   | 120  | 64                                | 17                                  |
| Aug. 17 | 0845     | 2,050                    | 859                     | 7.5             | 28.0                 | 240   | 130  | 66                                | 18                                  |
| Sep. 21 | 0910     | 6,570                    | 864                     | 7.7             | 26.5                 | 230   | 130  | 65                                | 17                                  |
| Oct. 19 | 0930     | 1,380                    | 892                     | 7.9             | 25.5                 | 260   | 160  | 70                                | 20                                  |
| Nov. 16 | 1030     | 961                      | 921                     | 7.9             | 20.5                 | 250   | 150  | 69                                | 18                                  |
| Dec. 14 | 1015     | 1,570                    | 934                     | 7.8             | 20.0                 | 250   | 150  | 70                                | 19                                  |

|         | Sodium ion (Na), Dissolved | Sodium Adsorption Ratio(SAR) | Potassium ion (K), Dissolved | Alkalinity Total (as CaCO <sub>3</sub> ) | Sulfate ion (SO <sub>4</sub> ), Dissolved | Chloride ion (Cl), Dissolved | Silica (SiO <sub>2</sub> ), Dissolved | Solids Dissolved (Calculated) |
|---------|----------------------------|------------------------------|------------------------------|--|---|------------------------------|---------------------------------------|-------------------------------|
| Date    | mg/L                       |                              | mg/L                         | mg/L                                     | mg/L                                      | mg/L                         | mg/L                                  | mg/L                          |
| Jan. 26 | 110                        | 3.0                          | 4.8                          | 100                                      | 250                                       | 110                          | 11                                    | 636                           |
| Feb. 17 | 110                        | 2.9                          | 4.7                          | 110                                      | 240                                       | 110                          | 11                                    | 635                           |
| Mar. 17 | 110                        | 3.0                          | 4.6                          | 120                                      | 240                                       | 110                          | 11                                    | 640                           |
| Apr. 14 | 110                        | 2.9                          | 4.8                          | 110                                      | 250                                       | 110                          | 10                                    | 645                           |
| May 18  | 110                        | 2.9                          | 4.6                          | 110                                      | 240                                       | 110                          | 11                                    | 635                           |
| June 15 | 94                         | 2.6                          | 4.4                          | 110                                      | 210                                       | 99                           | 11                                    | 571                           |
| July 13 | 84                         | 2.6                          | 4.5                          | 98                                       | 200                                       | 82                           | 10                                    | 521                           |
| Aug. 17 | 83                         | 2.5                          | 4.6                          | 110                                      | 200                                       | 82                           | 11                                    | 531                           |
| Sep. 21 | 85                         | 2.6                          | 4.5                          | 100                                      | 200                                       | 92                           | 12                                    | 536                           |
| Oct. 19 | 94                         | 2.7                          | 4.5                          | 100                                      | 220                                       | 94                           | 12                                    | 575                           |
| Nov. 16 | 89                         | 2.6                          | 4.7                          | 100                                      | 210                                       | 93                           | 12                                    | 556                           |
| Dec. 14 | 93                         | 2.7                          | 4.6                          | 100                                      | 210                                       | 100                          | 12                                    | 569                           |

## QUALITY OF WATER - 1981

Rio Grande below Falcon Dam near Falcon, Texas and Nueva Cd. Guerrero, Tamaulipas

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

|    | January  | February | April    | June   | July      | September | November |  |
|----|----------|----------|----------|--------|-----------|-----------|----------|--|
| 2  | 1,020    | 25 1,010 | 17 1,020 | 8 962  | 29 869    | 18 855    | 9 911    |  |
| 5  | 1,010    | 27 1,010 | 20 1,020 | 10 965 | 31 863    | 21 857    | 12 918   |  |
| 7  | 1,020    | March    |          | 12 985 | August    |           | 13 920   |  |
| 9  | 1,010    | 2 1,020  | 24 1,010 | 15 957 | 3 856     | 25 871    | 16 956   |  |
| 12 | 1,020    | 4 1,010  | 27 1,020 | 17 923 | 5 851     | 28 867    | 18 923   |  |
| 14 | 1,010    | 6 1,020  | 29 1,020 | 19 945 | 7 856     | 30 870    | 20 920   |  |
| 16 | 1,010    | 9 1,010  | May      |        | 10 852    | October   |          |  |
| 19 | 1,020    | 11 1,010 | 1 1,020  | 24 900 | 12 853    | 2 873     | 25 925   |  |
| 21 | 1,010    | 13 1,000 | 4 1,020  | 26 913 | 14 848    | 5 887     | 27 930   |  |
| 23 | 1,010    | 16 1,010 | 6 1,020  | 29 905 | 17 856    | 7 890     | 30 932   |  |
| 26 | 1,010    | 18 1,010 | 8 1,020  | July   |           | 9 890     | December |  |
| 28 | 1,020    | 20 1,020 | 11 1,020 | 1 912  | 21 850    | 13 890    | 2 929    |  |
| 30 | 1,010    | 23 1,020 | 13 1,020 | 2 904  | 24 854    | 14 889    | 4 930    |  |
|    | February |          | 15 1,010 | 6 876  | 26 851    | 16 896    | 7 930    |  |
| 2  | 1,030    | 27 1,020 | 18 1,050 | 8 879  | 28 861    | 19 891    | 9 929    |  |
| 4  | 1,010    | 30 1,020 | 20 1,010 | 10 873 | 31 854    | 21 894    | 11 930   |  |
| 6  | 1,010    | April    |          | 13 865 | September |           | 23 898   |  |
| 9  | 1,010    | 1 1,020  | 22 1,010 | 15 919 | 2 892     | 26 896    | 16 935   |  |
| 11 | 1,010    | 3 1,020  | 27 1,000 | 17 896 | 4 859     | 28 898    | 18 935   |  |
| 13 | 1,010    | 6 1,020  | 29 1,000 | 20 887 | 8 852     | 30 903    | 21 940   |  |
| 17 | 1,010    | 8 1,020  | June     |        | 9 849     | November  |          |  |
| 18 | 1,010    | 10 1,020 | 1 985    | 24 857 | 11 850    | 2 940     | 26 940   |  |
| 20 | 1,010    | 13 1,020 | 3 989    | 27 872 | 14 855    | 4 915     | 28 949   |  |
| 23 | 1,020    | 15 1,020 | 5 981    |        | 16 852    | 6 911     | 30 942   |  |

## Rancherias Drain near Camargo, Tamaulipas

LOCATION: At a point about 1,950 feet (600 m) from the confluence with the Rio Grande, which is located at river mile 241.6 (388.8 km). This drain carries wastewater from the Lower Rio San Juan Irrigation District in Mexico.

RECORDS: Specific conductance, 1948 and 1960 through 1981.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

|    | January  | March    | May      | July     | August    | October  | November |          |
|----|----------|----------|----------|----------|-----------|----------|----------|----------|
| 7  | 6,100    | 4 6,770  | 6 5,400  | 1 6,370  | 19 6,180  | 7 6,170  | 18 6,690 |          |
| 14 | 6,160    | 18 7,330 | 13 5,650 | 8 4,900  | 26 4,790  | 15 6,240 | 25 6,690 |          |
| 21 | 6,060    | 25 7,140 | 20 6,670 | 15 6,430 | September |          | December |          |
| 28 | 5,580    | April    |          | 27 3,350 | 22 6,600  | 2 6,430  | 28 6,560 |          |
|    | February |          | June     |          | 29 6,690  | 9 6,930  | November |          |
| 4  | 7,060    | 1 7,250  | 10 6,860 | August   |           | 17 6,990 | 4 6,530  | 16 7,040 |
| 11 | 7,010    | 8 7,250  | 24 6,920 | 5 6,130  | 23 6,020  | 11 6,810 | 23 6,910 |          |
| 18 | 6,720    | 15 7,300 |          | 12 4,610 | 30 4,630  |          | 30 6,850 |          |
|    | March    |          | May      |          | August    |          | October  |          |
|    | January  |          | July     |          | September |          | November |          |

## QUALITY OF WATER - 1981

## Rio San Juan at Camargo, Tamaulipas

LOCATION: At gaging station, 3.1 river miles (5 km) from the confluence with the Rio Grande, which is located at river mile 238.7 (384.1 km).

RECORDS: Specific conductance, 1960 through 1981.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January    | March      | May        | July       | August     | October  | November   |
|------------|------------|------------|------------|------------|----------|------------|
| 7 # 2,250  | 4 # 2,380  | 6 # 1,010  | 1 1,900    | 19 # 2,130 | 7 909    | 18 # 944   |
| 14 # 2,330 | 18 # 4,160 | 13 # 2,630 | 8 1,400    | 26 # 1,910 | 15 922   | 25 # 1,020 |
| 21 2,330   | 25 # 3,020 | 20 2,690   | 15 2,070   | September  | 21 961   | December   |
| 28 # 2,620 | April      | 27 2,360   | 22 # 1,010 | 2 # 955    | 28 # 901 | 2 # 1,030  |
| February   | 1 2,710    | June       | 29 963     | 9 952      | November | 9 # 1,040  |
| 4 # 2,690  | 8 # 4,170  | 10 2,020   | August     | 17 1,120   | 4 # 926  | 16 # 1,070 |
| 11 # 2,320 | 29 1,250   | 24 # 2,170 | 5 # 1,050  | 23 1,260   | 11 # 918 | 23 # 1,080 |
| 18 2,360   |            |            | 12 # 1,590 |            |          | 30 # 1,080 |

# Below Marte R. Gomez Dam

## Rio Grande at Rio Grande City, Texas near Camargo, Tamaulipas

LOCATION: Gaging station at river mile 235.0 (378.1 km), 3.7 river miles (6.0 km) downstream from Rio San Juan.

RECORDS: Chemical analyses, 1959 through 1981; specific conductance, 1958 through 1981; suspended silt, 1959 through 1977.

REMARKS: Sampling by the International Boundary and Water Commission; chemical analyses by the U.S. Geological Survey; specific conductance determinations by the International Boundary and Water Commission.

| 1981    | Time     | Streamflow,<br>Momentary | Specific<br>Conductance | pH    | Temper-<br>ature | Hardness,<br>Total<br>(as CaCO <sub>3</sub> ) | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> ) | Calcium<br>ion (Ca),<br>Dissolved | Magnesium<br>ion (Mg),<br>Dissolved |
|---------|----------|--------------------------|-------------------------|-------|------------------|---|--|-----------------------------------|-------------------------------------|
| Date    | Standard | Second-Feet              | Microhos                | Units | Deg C            | mg/L  | mg/L   | mg/L                              | mg/L                                |
| Jan. 19 | 1330     | 1,150                    | 1,240                   | 7.8   | 9.5              | 290   | 170  | 79                                | 22                                  |
| Feb. 17 | 1410     | 2,930                    | 1,100                   | 7.8   | 15.0             | 270   | 160  | 75                                | 21                                  |
| Mar. 17 | 1030     | 167                      | 2,260                   | 7.7   | 18.0             | 550   | 350  | 150                               | 43                                  |
| Apr. 24 | 1130     | 6,290                    | 1,020                   | 7.7   | 19.0             | 270   | 160  | 74                                | 20                                  |
| May 21  | 1230     | 13,500                   | 1,000                   | 7.5   | 23.0             | 260   | 150  | 72                                | 20                                  |
| June 15 | 1405     | 4,310                    | 984                     | 7.5   | 28.0             | 270   | 150  | 77                                | 19                                  |
| July 24 | 0845     | 3,710                    | 935                     | 7.6   | 28.0             | 250   | 130  | 69                                | 18                                  |
| Aug. 17 | 0748     | 5,650                    | 865                     | 7.6   | 28.0             | 240   | 130  | 67                                | 18                                  |
| Sep. 16 | 1000     | 4,800                    | 913                     | 7.5   | 22.0             | 240   | 130  | 67                                | 18                                  |
| Oct. 19 | 1320     | 4,060                    | 933                     | 7.7   | 20.0             | 250   | 140  | 70                                | 19                                  |
| Nov. 16 | 1340     | 3,020                    | 967                     | 7.6   | 22.0             | 260   | 150  | 71                                | 19                                  |
| Dec. 15 | 1045     | 3,340                    | 1,010                   | 7.7   | 16.0             | 270   | 160  | 75                                | 20                                  |

| 1981    | Sodium<br>Ion (Na),<br>Dissolved | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> ) | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved | Chloride<br>ion (Cl),<br>Dissolved | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved | Solids<br>Dissolved<br>(Calculated) |
|---------|----------------------------------|------------------------------------|------------------------------------|--|---|------------------------------------|---|-------------------------------------|
| Date    | mg/L                             |                                    | mg/L                               | mg/L   | mg/L  | mg/L                               | mg/L  | mg/L                                |
| Jan. 19 | 150                              | 3.8                                | 4.7                                | 120  | 280   | 160                                | 11  | 779                                 |
| Feb. 17 | 130                              | 3.4                                | 4.7                                | 110  | 280   | 130                                | 9.7   | 717                                 |
| Mar. 17 | 270                              | 5.0                                | 6.0                                | 200  | 400   | 400                                | 14  | 1,400                               |
| Apr. 24 | 110                              | 2.7                                | 4.8                                | 110  | 250   | 100                                | 10  | 635                                 |
| May 21  | 110                              | 3.0                                | 4.7                                | 120  | 220   | 110                                | 12  | 615                                 |
| June 15 | 100                              | 2.6                                | 4.4                                | 110  | 210   | 96                                 | 11  | 571                                 |
| July 24 | 92                               | 2.7                                | 4.4                                | 110  | 210   | 82                                 | 11  | 544                                 |
| Aug. 17 | 85                               | 2.5                                | 4.6                                | 110  | 200   | 110                                | 11  | 572                                 |
| Sep. 16 | 95                               | 2.8                                | 4.7                                | 110  | 210   | 100                                | 12  | 578                                 |
| Oct. 19 | 96                               | 2.8                                | 4.5                                | 110  | 210   | 110                                | 11  | 588                                 |
| Nov. 16 | 96                               | 2.8                                | 4.8                                | 110  | 220   | 120                                | 12  | 628                                 |
| Dec. 15 | 110                              | 3.1                                | 4.6                                | 110  |   |                                    |   |                                     |

**QUALITY OF WATER - 1981****Rio Grande at Rio Grande City, Texas near Camargo, Tamaulipas****SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981**

| January  | February | April    | June        | July         | September   | November       |
|----------|----------|----------|-------------|--------------|-------------|----------------|
| 1 1,260  | 25 1,130 | 17 1,060 | 8 968       | 29 823       | 18 875      | 8 1,130        |
| 5 1,070  | 27 1,110 | 20 1,070 | 10 990      | 31 884       | 21 866      | 11 991         |
| 7 1,070  | March 22 | 1,020    | 12 993      | August 3 912 | 23 864      | 13 974         |
| 9 1,050  | 2 1,050  | 24 1,020 | 15 962      | 25 866       | 16 1,020    |                |
| 12 1,060 | 4 1,120  | 27 1,020 | 17 773      | 28 894       | 18 1,040    |                |
| 14 1,130 | 6 1,130  | 29 1,040 | 19 937      | 7 871        | 30 875      | 20 1,050       |
| 16 1,740 | 9 1,140  | May 22   | 940         | 10 858       | October 23  | 23 961         |
| 19 1,170 | 11 1,110 | 1 1,030  | 24 930      | 12 873       | 2 887       | 25 986         |
| 21 1,260 | 13 1,380 | 4 772    | 26 916      | 14 881       | 5 907       | 27 996         |
| 23 1,400 | 16 1,690 | 6 1,000  | 29 908      | 17 857       | 7 972       | 30 996         |
| 26 1,360 | 18 1,500 | 8 1,020  | July 19 954 | 19 875       | 9 990       | December 2 977 |
| 28 1,300 | 20 1,550 | 11 1,010 | 1 954       | 21 888       | 12 911      | 4 985          |
| 29 1,320 | 23 1,140 | 13 1,010 | 3 912       | 24 879       | 14 901      | 7 976          |
| February | 25 1,140 | 15 1,020 | 6 918       | 26 877       | 16 901      |                |
| 2 1,420  | 27 1,110 | 18 1,010 | 8 898       | 28 536       | 19 923      | 9 960          |
| 4 1,300  | 30 1,050 | 20 1,000 | 10 892      | 31 944       | 21 933      | 11 997         |
| 6 1,360  | April 22 | 1,010    | 13 881      | September 23 | 901         | 14 972         |
| 9 1,270  | 1 1,090  | 25 984   | 15 933      | 2 978        | 26 924      | 16 975         |
| 11 1,300 | 3 1,050  | 27 1,000 | 17 1,200    | 4 969        | 28 908      | 18 1,020       |
| 13 1,350 | 6 1,150  | 29 1,000 | 20 964      | 7 888        | 30 932      | 21 988         |
| 16 1,270 | 8 1,030  | June 22  | 22 922      | 9 878        | November 23 | 963            |
| 18 1,050 | 10 1,030 | 1 957    | 24 894      | 11 866       | 2 997       | 25 960         |
| 20 1,050 | 13 1,040 | 3 947    | 27 888      | 14 881       | 4 947       | 28 962         |
| 23 1,120 | 15 1,020 | 5 928    |             | 16 932       | 6 1,010     | 30 974         |

**Puertecitos Drain and Los Indios Drain near Cd. Diaz Ordaz, Tamaulipas**

LOCATION: For Puertecitos Drain, at a point about 8,500 feet (2,600 m) from the confluence with the Rio Grande, which is located at river mile 219.3 (352.9 km); and, for Los Indios Drain, at a point about 2,150 feet (650 m) from its confluence with Puertecitos Drain. These two drains join at a point about 4,250 feet (1,300 m) from the confluence with the Rio Grande. These drains carry wastewater from the Lower Rio San Juan Irrigation District in Mexico.

Irrigation District in Mexico.

RECORDS: Specific conductance, 1960 through 1981.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

**SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981**

| Date   | Puertecitos Drain | Los Indios Drain | Date    | Puertecitos Drain | Los Indios Drain | Date    | Puertecitos Drain | Los Indios Drain | Date    | Puertecitos Drain | Los Indios Drain |
|--------|-------------------|------------------|---------|-------------------|------------------|---------|-------------------|------------------|---------|-------------------|------------------|
| Jan. 7 | 3,100             | 2,470            | Apr. 15 | 3,240             | 2,390            | July 22 | 3,620             | 2,730            | Oct. 15 | 3,090             | 2,500            |
| 14     | 3,090             | 2,440            | 22      | 3,090             | 2,480            | 29      | 3,380             | 2,690            | 21      | 2,990             | 2,720            |
| 21     | 3,110             | 2,400            | 29      | 2,940             | 2,460            | Aug. 5  | 3,170             | 2,520            | 28      | 3,180             | 2,690            |
| 28     | 3,110             | 2,430            | May 6   | 3,180             | 2,760            | 12      | 2,990             | 2,480            | Nov. 4  | 3,220             | 2,630            |
| Feb. 4 | 3,110             | 2,420            | 13      | 3,380             | 2,460            | 19      | 2,950             | 1,700            | 11      | 3,100             | 2,620            |
| 11     | 3,280             | 2,480            | 20      | 3,350             | 2,220            | 26      | 3,040             | 2,690            | 18      | 2,940             | 2,080            |
| 18     | 3,060             | 2,410            | 27      | 3,230             | 2,520            | Sept. 2 | 3,230             | 2,660            | 25      | 2,910             | 2,380            |
| Mar. 4 | 3,080             | 2,520            | June 10 | 3,790             | 2,820            | 9       | 3,410             | 2,700            | Dec. 2  | 3,100             | 2,900            |
| 18     | 3,090             | 2,510            | 24      | 3,970             | 2,780            | 17      | 3,220             | 2,700            | 9       | 3,190             | 2,650            |
| 25     | 3,220             | 2,540            | July 1  | 3,850             | 2,710            | 23      | 3,280             | 2,670            | 16      | 3,190             | 2,870            |
| Apr. 1 | 3,110             | 2,470            | 8       | 3,740             | 2,790            | 30      | 3,190             | 2,780            | 23      | 3,260             | 2,650            |
| 8      | 3,240             | 2,400            | 15      | 3,770             | 2,650            | Oct. 7  | 2,910             | 2,760            | 30      | 3,110             | 2,590            |

## QUALITY OF WATER - 1981

## Rio Grande at Los Ebanos, Texas near Cd. Diaz Ordaz, Tamaulipas

**LOCATION:** Gaging station at river mile 204.3 (328.8 km) 34.0 river miles (54.7 km) upstream from Anzalduas Dam.  
**RECORDS:** Chemical analyses, June 1977 through 1981. Specific conductance, 1956 through 1981.  
**REMARKS:** Sampling by the International Boundary and Water Commission, chemical analyses by the U. S. Geological Survey, determinations for specific conductance by the International Boundary and Water Commission.

| 1981<br>Date | Time<br>Standard | Streamflow,<br>Second-Feet | Specific<br>Conductance<br>Micromhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|----------------------------|--------------------------------------|-------------|---------------------------|---|--|---|---|
| Jan. 19      | 1415             | 795                        | 1,390                                | 7.7         | 9.5                       | 330   | 200  | 91  | 25  |
| Feb. 17      | 1500             | 618                        | 1,690                                | 7.8         | 15.0                      | 380   | 240  | 100                                       | 31  |
| Mar. 17      | 1133             | 180                        | 1,880                                | 7.6         | 19.0                      | 400   | 250  | 110                                       | 31  |
| Apr. 24      | 1215             | 7,200                      | 1,000                                | 7.7         | 20.0                      | 260   | 150  | 71  | 19  |
| May 21       | 1320             | 13,500                     | 1,000                                | 7.5         | 23.5                      | 260   | 150  | 72  | 20  |
| June 15      | 1520             | 6,390                      | 993                                  | 7.6         | 28.0                      | 260   | 140  | 73  | 19  |
| July 24      | 0936             | 1,780                      | 959                                  | 7.5         | 28.0                      | 250   | 130  | 69  | 18  |
| Aug. 17      | 1430             | 5,650                      | 947                                  | 7.6         | 30.0                      | 260   | 150  | 72  | 19  |
| Sep. 16      | 1100             | 3,020                      | 954                                  | 7.4         | 23.0                      | 250   | 130  | 69  | 18  |
| Oct. 19      | 1400             | 4,910                      | 984                                  | 7.7         | 20.5                      | 260   | 150  | 72  | 20  |
| Nov. 16      | 1415             | 2,190                      | 1,030                                | 7.8         | 23.5                      | 270   | 160  | 74  | 20  |
| Dec. 15      | 1130             | 1,410                      | 1,060                                | 7.7         | 16.0                      | 280   | 170  | 76  | 21  |

| 1981<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|--|--|---|--|---|---|
| Jan. 19      | 170                                      | 4.1                                | 5.0  | 130  | 300   | 190  | 12  | 871   |
| Feb. 17      | 210                                      | 4.7                                | 5.2  | 140  | 340   | 250  | 10  | 1,030                                       |
| Mar. 17      | 240                                      | 5.2                                | 5.2  | 150  | 340   | 300  | 12  | 1,130                                       |
| Apr. 24      | 100                                      | 2.7                                | 4.6  | 110  | 240   | 100  | 10  | 611   |
| May 21       | 110                                      | 3.0                                | 4.6  | 110  | 240   | 110  | 10  | 633   |
| June 15      | 100                                      | 2.7                                | 4.5  | 120  | 220   | 110  | 11  | 610   |
| July 24      | 97                                       | 2.9                                | 4.6  | 120  | 210   | 97   | 11  | 579   |
| Aug. 17      | 96                                       | 2.8                                | 4.9  | 110  | 220   | 98   | 11  | 587   |
| Sep. 16      | 97                                       | 2.9                                | 4.5  | 120  | 210   | 80   | 11  | 562   |
| Oct. 19      | 100                                      | 2.9                                | 4.5  | 110  | 210   | 110  | 12  | 595   |
| Nov. 16      | 110                                      | 3.1                                | 4.7  | 110  | 230   | 130  | 12  | 647   |
| Dec. 15      | 120                                      | 3.4                                | 4.7  | 110  | 230   | 130  | 12  | 660   |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,670 | 1,760 | 1,320 | 1,120 | 939   | 920   | 943   | 890   |       | 960   | 970   | 1,200 |
| 2   | 1,750 | 1,770 | 1,280 | 1,130 | 1,060 | 950   | 912   | 953   | 1,120 |       | 1,000 | 1,150 |
| 3   | 1,760 | 1,910 | 1,180 | 1,140 |       | 940   | 923   | 934   |       | 1,150 |       | 1,130 |
| 4   | 1,790 | 1,960 | 1,160 | 1,070 | 952   | 985   | 908   | 921   | 1,140 |       | 1,070 |       |
| 5   | 1,660 | 1,710 | 1,200 | 1,050 | 646   | 980   | 908   | 932   | 1,100 | 946   | 1,110 | 1,120 |
| 6   | 1,350 | 1,630 | 1,300 | 1,120 | 920   | 952   | 923   | 928   | 1,080 |       | 1,200 | 1,120 |
| 7   | 1,220 | 1,650 | 1,380 | 1,130 | 1,010 | 982   | 938   | 910   | 1,020 | 986   | 1,240 | 1,120 |
| 8   | 1,140 | 1,770 | 1,380 | 1,080 | 1,010 | 991   | 901   | 896   | 926   | 1,050 | 1,370 | 1,120 |
| 9   | 1,120 | 1,730 | 1,210 | 1,050 | 1,020 | 1,010 | 909   | 892   | 958   |       | 1,370 | 1,120 |
| 10  | 1,010 | 1,720 | 1,160 | 1,050 | 1,020 | 1,030 | 908   | 887   | 900   |       | 1,300 | 1,120 |
| 11  | 1,050 | 1,640 | 1,120 | 1,040 | 1,020 | 1,040 | 896   | 924   | 895   |       | 1,120 | 1,120 |
| 12  | 1,110 | 1,670 | 1,130 | 1,040 | 1,020 | 1,050 | 888   | 898   | 883   | 934   | 1,080 | 1,120 |
| 13  | 1,120 | 1,590 | 1,240 | 1,040 | 1,020 | 1,040 | 887   | 898   | 898   |       | 1,070 | 1,120 |
| 14  | 1,160 | 1,670 | 1,460 | 1,040 | 1,020 | 1,020 | 894   | 893   | 896   | 919   | 1,080 | 1,120 |
| 15  | 1,250 | 1,630 | 1,710 | 1,040 | 1,020 | 999   | 909   | 903   | 917   |       | 1,080 | 1,120 |
| 16  | 1,580 | 1,670 | 1,930 | 1,030 | 1,020 | 994   | 989   | 893   | 926   | 913   | 1,080 | 1,120 |
| 17  | 1,850 | 1,660 | 2,240 | 1,030 | 983   | 923   | 1,110 | 900   | 893   |       | 1,090 | 1,110 |
| 18  | 1,660 | 1,310 | 2,440 | 1,020 | 1,010 | 781   | 1,300 | 898   | 948   |       | 1,100 | 1,110 |
| 19  | 1,350 | 1,120 | 2,380 | 964   | 1,010 | 936   | 1,050 | 895   | 891   | 927   | 1,100 | 1,120 |
| 20  | 1,510 | 1,110 | 2,230 | 1,020 | 1,010 | 952   | 1,060 | 898   | 880   |       | 1,100 | 1,050 |
| 21  | 1,390 | 1,070 | 1,720 | 1,040 | 1,010 | 957   | 1,070 | 895   | 893   | 984   | 1,110 | 1,070 |
| 22  | 1,410 | 1,060 | 2,110 | 1,030 | 1,010 | 959   | 983   | 939   | 894   | 987   | 1,110 | 1,070 |
| 23  | 1,640 | 1,070 | 1,840 | 1,010 | 1,020 | 957   | 989   | 915   | 887   | 972   | 1,090 | 1,120 |
| 24  | 1,570 | 1,120 | 1,390 | 1,010 | 1,020 | 949   | 952   | 919   | 880   | 919   | 1,100 | 1,090 |
| 25  | 1,630 | 1,230 | 1,400 | 1,010 | 1,020 | 938   | 949   | 917   | 883   | 942   | 1,100 | 1,080 |
| 26  | 1,650 | 1,290 | 1,370 | 1,020 | 992   | 931   | 949   | 936   | 885   | 941   | 1,130 | 1,070 |
| 27  | 1,680 | 1,280 | 1,230 | 1,020 | 1,000 | 937   | 940   | 950   | 886   | 932   | 1,120 | 1,080 |
| 28  | 1,720 | 1,310 | 1,180 | 1,020 | 1,010 | 927   | 956   | 1,110 | 887   | 924   | 1,130 | 1,080 |
| 29  | 1,710 | 1,140 | 1,040 | 1,010 | 941   | 967   | 1,120 | 916   | 926   | 1,120 | 1,080 |       |
| 30  | 1,720 | 1,120 | 1,050 | 877   | 999   | 922   | 927   | 979   | 904   | 935   | 1,130 | 1,060 |
| 31  | 1,770 |       | 1,110 |       |       |       | 915   |       | 945   |       |       | 1,070 |

## QUALITY OF WATER - 1981

## Rio Grande at Penitas, Texas and Reynosa Diaz, Tamaulipas

LOCATION: At the H.C.W.C. & I. District No. 1 (Edinburg) pumping plant, river mile 186.6 (300.4 km), 16.3 river miles (26.2 km) upstream from Anzaldus Dam.

RECORDS: Specific conductance, 1963 through 1981.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| January  | February | April    | June     | July         | September   | November |
|----------|----------|----------|----------|--------------|-------------|----------|
| 2 1,430  | 25 1,160 | 15 1,070 | 5 1,000  | 29 1,080     | 18 916      | 9 1,380  |
| 5 1,840  | 27 1,250 | 17 1,060 | 8 1,120  | 31 1,030     | 21 912      | 11 1,450 |
| 7 1,920  | March 20 | 1,030    | 10 1,010 | August 3     | 23 912      | 13 1,140 |
| 9 1,310  | 2 1,280  | 22 1,060 | 12 1,070 | 1,040        | 25 891      | 16 1,130 |
| 12 1,220 | 4 1,250  | 24 1,030 | 15 1,060 | 5 1,030      | 28 908      | 18 1,090 |
| 14 1,100 | 6 1,220  | 27 1,140 | 17 1,010 | 7 978        | 30 917      | 20 1,170 |
| 16 1,380 | 9 1,350  | 29 968   | 19 814   | 10 941       | October 23  | 1,150    |
| 19 1,680 | 11 1,320 | May 22   | 1,160    | 12 916       | 2 932       | 25 1,110 |
| 21 1,770 | 13 1,320 | 1 992    | 24 977   | 14 964       | 5 973       | 27 1,160 |
| 23 1,790 | 16 1,440 | 4 1,080  | 26 960   | 17 961       | 7 972       | 30 1,150 |
| 26 1,880 | 18 1,350 | 6 786    | 29 941   | 19 944       | 9 1,090     | December |
| 28 1,750 | 20 1,440 | 8 1,060  | July 21  | 21 930       | 12 962      | 2 1,110  |
| 30 1,770 | 23 1,920 | 11 1,220 | 1 945    | 24 946       | 14 951      | 4 1,100  |
| February | 25 1,670 | 13 1,060 | 3 938    | 26 995       | 16 933      | 7 1,360  |
| 2 1,850  | 27 1,580 | 15 1,160 | 6 918    | 28 1,030     | 19 1,250    | 9 1,120  |
| 4 1,860  | 30 1,200 | 18 1,070 | 8 920    | 31 1,090     | 21 1,010    | 11 1,100 |
| 6 1,890  | April 20 | 1,020    | 10 966   | September 23 | 1,080       | 14 1,110 |
| 9 2,060  | 1 1,150  | 22 1,020 | 13 925   | 2 1,110      | 26 1,060    | 16 1,100 |
| 11 2,020 | 3 1,150  | 25 1,020 | 15 1,050 | 4 1,020      | 28 1,060    | 18 1,100 |
| 13 1,940 | 6 1,110  | 27 1,010 | 17 987   | 7 1,200      | 30 1,060    | 21 1,120 |
| 16 1,860 | 8 1,120  | 29 1,030 | 20 1,130 | 9 1,190      | November 23 | 1,140    |
| 18 1,930 | 10 1,100 | June 22  | 1,080    | 11 1,170     | 2 1,050     | 25 1,120 |
| 20 1,270 | 13 1,060 | 1 914    | 24 1,220 | 14 905       | 4 1,050     | 28 1,130 |
| 23 1,150 | 3 967    | 27 1,020 | 16 978   | 6 1,420      | 30 1,140    |          |

## Morillo Drain near Anzaldus Dam

LOCATION: At the Morillo Drain Project pumping plant located about 0.4 river mile (0.6 km) from the confluence with the Rio Grande or at the gaging station on the bypass channel 0.4 mile (0.6 km) from the pumping plant. With the Rio Grande enters the Rio Grande at river mile 179.1 (288.3 km), 8.8 river miles (14.2 km) upstream from Anzaldus Dam. This drain carries wastewater from the Lower Rio San Juan Irrigation District in Mexico and surface runoff during periods of heavy precipitation.

RECORDS: Chemical analyses, 1962 through 1981; specific conductance, 1956 through 1981.

REMARKS: Sampling by the International Boundary and Water Commission and chemical analyses by the U. S. Geological Survey. Determinations for specific conductance by the International Boundary and Water Commission.

| 1981    | Time     | Streamflow, Momentary | Specific Conductance | pH    | Temper- | Hardness, Total (as CaCO <sub>3</sub> ) | Hardness, Noncarbonate (as CaCO <sub>3</sub> ) | Calcium ion (Ca), Dissolved | Magnesium ion (Mg), Dissolved |
|---------|----------|-----------------------|----------------------|-------|---------|---|--|-----------------------------|-------------------------------|
| Date    | Standard | Second-Feet           | Micromhos            | Units | Deg C   | mg/L                                    | mg/L   | mg/L                        | mg/L                          |
| Jan. 20 | 1200     | 63.6                  | 8,490                | 7.8   | 9.5     | 1,300                                   | 1,100  | 310                         | 130                           |
| Feb. 17 | 0920     | 42.4                  | 9,880                | 7.8   | 16.0    | 1,600                                   | 1,400  | 370                         | 170                           |
| Mar. 17 | 1250     | 42.0                  | 10,800               | 7.7   | 20.5    | 1,800                                   | 1,600  | 430                         | 180                           |
| Apr. 21 | 1135     | 42.7                  | 9,150                | 7.7   | 26.0    | 1,700                                   | 1,500  | 400                         | 170                           |
| May 21  | 1415     | 114                   | 5,190                | 7.5   | 27.0    | 880                                     | 680  | 220                         | 80                            |
| June 16 | 1400     | 74.9                  | 8,340                | 7.8   | 28.0    | 1,200                                   | 980  | 290                         | 120                           |
| July 28 | 0840     | 57.2                  | 8,510                | 7.7   | 28.0    | 1,300                                   | 1,000  | 300                         | 130                           |
| Aug. 17 | 1345     | 80.5                  | 6,720                | 7.7   | 30.0    | 1,100                                   | 840  | 260                         | 100                           |
| Sep. 17 | 1450     | 63.6                  | 7,720                | 7.7   | 26.5    | 1,200                                   | 860  | 280                         | 110                           |
| Oct. 13 | 1430     | 78.8                  | 7,180                | 7.7   | 29.5    | 1,100                                   | 860  | 250                         | 110                           |
| Nov. 18 | 0730     | 92.5                  | 6,780                | 7.6   | 20.5    | 1,100                                   | 830  | 260                         | 100                           |
| Dec. 14 | 1130     | 56.2                  | 7,990                | 7.8   | 20.0    | 1,200                                   | 930  | 270                         | 120                           |

| 1981    | Sodium ion (Na), Dissolved | Sodium Adsorption Ratio (SAR) | Potassium ion (K), Dissolved | Alkalinity Total (as CaCO <sub>3</sub> ) | Sulfate ion (SO <sub>4</sub> ), Dissolved | Chloride ion (Cl), Dissolved | Silica (SiO <sub>2</sub> ), Dissolved | Solids Dissolved (Calculated) |
|---------|----------------------------|-------------------------------|------------------------------|--|---|------------------------------|---------------------------------------|-------------------------------|
| Date    | mg/L                       | mg/L                          | mg/L                         | mg/L                                     | mg/L                                      | mg/L                         | mg/L                                  | mg/L                          |
| Jan. 20 | 1,500                      | 18                            | 7.9                          | 240                                      | 1,600                                     | 2,000                        | 32                                    | 5,720                         |
| Feb. 17 | 1,700                      | 18                            | 7.9                          | 250                                      | 1,900                                     | 2,500                        | 32                                    | 6,830                         |
| Mar. 17 | 2,000                      | 20                            | 8.6                          | 260                                      | 1,900                                     | 3,000                        | 29                                    | 7,700                         |
| Apr. 21 | 1,600                      | 17                            | 8.8                          | 240                                      | 1,600                                     | 2,300                        | 32                                    | 6,260                         |
| May 21  | 900                        | 13                            | 7.1                          | 240                                      | 1,600                                     | 2,000                        | 38                                    | 5,900                         |
| June 16 | 1,700                      | 21                            | 7.8                          | 240                                      | 1,600                                     | 1,900                        | 37                                    | 5,620                         |
| July 28 | 1,500                      | 18                            | 9.2                          | 220                                      | 1,400                                     | 1,500                        | 33                                    | 4,630                         |
| Aug. 17 | 1,200                      | 16                            | 9.6                          | 220                                      | 1,500                                     | 1,700                        | 37                                    | 5,070                         |
| Sep. 17 | 1,300                      | 17                            | 8.5                          | 230                                      | 1,500                                     | 1,500                        | 36                                    | 4,640                         |
| Oct. 13 | 1,200                      | 16                            | 7.4                          | 220                                      | 1,400                                     | 1,400                        | 32                                    | 4,440                         |
| Nov. 18 | 1,100                      | 15                            | 7.8                          | 230                                      | 1,400                                     | 1,800                        | 36                                    | 5,280                         |
| Dec. 14 | 1,400                      | 18                            | 8.1                          | 240                                      | 1,500                                     |                              |                                       |                               |

## QUALITY OF WATER - 1981

## Morillo Drain near Anzalduas Dam

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Date   | Bypass<br>Canal | Pumping<br>Plant | Date   | Bypass<br>Canal | Pumping<br>Plant | Date    | Bypass<br>Canal | Pumping<br>Plant | Date   | Bypass<br>Canal | Pumping<br>Plant |
|--------|-----------------|------------------|--------|-----------------|------------------|---------|-----------------|------------------|--------|-----------------|------------------|
| Jan. 5 | 9,050           |                  | Apr. 2 | 9,810           |                  | July 2  | 2               | 6,620            | Oct. 1 | 3,120           | 2,860            |
| 8      | 9,290           |                  | 9      | 10,050          |                  |         | 10,820          |                  | 5      | 3,150           | 3,390            |
| 12     | 6,820           |                  | 13     | 9,770           |                  | 6       | 8,930           |                  | 8      | 6,980           |                  |
| 15     | 9,230           |                  | 16     | 8,390           |                  | 9       | 8,150           | 8,540            | 12     | 7,330           |                  |
| 19     | 8,490           |                  | 20     | 7,700           |                  | 13      | 5,020           |                  | 15     | 6,860           |                  |
| 20     |                 | 8,490            | 23     |                 | 7,300            | 16      | 9,440           |                  | 19     | 5,080           |                  |
| 22     | 9,080           |                  | 27     |                 | 6,320            | 20      | 9,300           |                  | 22     | 6,760           |                  |
| 26     | 9,990           |                  | 30     | 7,610           |                  | 6       | 4,420           | 8,950            | 26     | 7,090           |                  |
| 29     | 10,170          |                  | May 4  | 2,700           |                  | 2,650   | 27              | 8,630            | 29     | 7,760           |                  |
| Feb. 2 | 9,890           |                  |        |                 | 6,820            | 30      | 8,180           |                  | Nov. 2 | 8,010           |                  |
| 5      | 9,770           |                  | 7      |                 | 9,150            | Aug. 3  | 8,240           |                  | 5      | 8,390           |                  |
| 9      | 9,850           |                  | 11     |                 | 6,860            | 6       | 8,210           |                  | 9      | 7,670           |                  |
| 12     | 9,510           |                  | 12     |                 | 10,190           | 10      | 7,320           |                  | 12     | 6,660           |                  |
| 16     | 9,910           |                  | 18     |                 | 5,820            | 13      | 7,420           |                  | 16     | 6,120           |                  |
| 17     |                 | 9,880            | 19     |                 | 5,370            | 17      | 6,880           |                  | 18     |                 | 6,780            |
| 19     | 9,810           |                  | 19     |                 | 5,160            | 20      | 6,860           | 6,820            | 19     | 6,650           |                  |
| 23     | 9,530           |                  | 21     |                 | 5,160            | 24      | 5,770           | 5,390            | 23     | 6,010           | 6,240            |
| 26     | 9,610           |                  | 25     |                 | 5,610            | 27      | 6,190           | 6,420            | 26     | 6,550           | 6,690            |
| Mar. 2 | 9,400           |                  | 26     |                 | 6,050            | 31      | 5,310           | 5,030            | 30     | 7,330           |                  |
| 5      | 9,560           |                  | 26     |                 | 4,760            | Sept. 3 | 6,980           |                  | Dec. 3 | 7,370           |                  |
| 9      | 9,990           |                  | June 1 |                 | 1,270            | 7       | 7,940           |                  | 7      | 7,870           |                  |
| 12     | 7,130           | 7,130            | 4      |                 | 1,180            | 10      | 8,270           |                  | 10     | 8,010           |                  |
| 16     | 10,460          |                  | 11     | 8,430           |                  | 14      | 8,400           |                  | 14     | 8,070           | 7,990            |
| 17     |                 | 10,790           | 15     | 8,560           |                  | 17      | 8,070           | 7,720            | 17     | 7,810           |                  |
| 19     | 10,660          |                  | 18     |                 | 1,030            | 21      | 7,170           |                  | 21     | 6,780           |                  |
| 23     | 10,660          |                  | 22     |                 | 7,090            | 24      | 7,130           |                  | 24     | 8,010           |                  |
| 26     | 10,460          |                  | 25     |                 | 7,010            | 28      | 7,270           |                  | 28     | 8,260           |                  |
| 30     | 10,250          |                  | 25     |                 | 10,270           |         |                 |                  | 31     | 7,340           |                  |
|        |                 |                  | 29     |                 | 5,340            |         |                 |                  |        |                 |                  |

## Rio Grande below Anzalduas Dam near Reynosa, Tamaulipas and Mission, Texas

LOCATION: At Anzalduas Dam, 0.5 river mile (0.8 km) above the gaging station, located at river mile 169.8 (273.3 km).

RECORDS: Chemical analyses, March 1959 through 1981; specific conductance, 1948 and 1956 through 1981; suspended silt, May 1956 through 1977.

REMARKS: Sampling by the International Boundary and Water Commission; chemical analyses by the U.S. Geological Survey; determinations for specific conductance by the International Boundary and Water Commission.

| 1981    | Time     | Streamflow,<br>Momentary | Specific<br>Conductance | pH    | Temper-<br>ature | Hardness,<br>Total<br>(as CaCO <sub>3</sub> ) | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> ) | Calcium<br>ion (Ca),<br>Dissolved | Magnesium<br>ion (Mg),<br>Dissolved |
|---------|----------|--------------------------|-------------------------|-------|------------------|---|--|-----------------------------------|-------------------------------------|
| Date    | Standard | Second-Feet              | Micromhos               | Units | Deg C            | mg/L  | mg/L   | mg/L                              | mg/L                                |
| Jan. 20 | 1130     | 364                      | 1,300                   | 7.7   | 12.0             | 300   | 180  | 82                                | 24                                  |
| Feb. 17 | 1000     | 1,020                    | 2,040                   | 7.9   | 16.0             | 490   | 330  | 130                               | 41                                  |
| Mar. 17 | 1310     | 343                      | 1,320                   | 7.8   | 20.0             | 310   | 190  | 83                                | 24                                  |
| Apr. 21 | 1200     | 3,300                    | 1,080                   | 7.6   | 25.5             | 270   | 160  | 74                                | 21                                  |
| May 21  | 1445     | 6,180                    | 1,070                   | 7.6   | 27.0             | 270   | 160  | 77                                | 20                                  |
| June 16 | 1430     | 5,400                    | 1,020                   | 7.7   | 28.0             | 260   | 150  | 72                                | 20                                  |
| July 28 | 0850     | 2,950                    | 1,070                   | 7.5   | 29.5             | 290   | 170  | 78                                | 22                                  |
| Aug. 17 | 1345     | 1,640                    | 972                     | 7.6   | 30.0             | 250   | 140  | 70                                | 19                                  |
| Sep. 17 | 1330     | 2,970                    | 1,000                   | 7.5   | 28.0             | 260   | 150  | 71                                | 21                                  |
| Oct. 13 | 1430     | 4,270                    | 952                     | 8.0   | 28.5             | 260   | 150  | 73                                | 20                                  |
| Nov. 18 | 0710     | 1,640                    | 1,130                   | 7.9   | 21.5             | 290   | 170  | 81                                | 22                                  |
| Dec. 14 | 1130     | 2,860                    | 1,110                   | 7.7   | 20.0             | 280   | 160  | 78                                | 21                                  |

| 1981    | Sodium<br>ion (Na),<br>Dissolved | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K),<br>Dissolved | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> ) | Sulfate<br>ion (SO <sub>4</sub> ),<br>Dissolved | Chloride<br>ion (Cl),<br>Dissolved | Silica<br>(SiO <sub>2</sub> ),<br>Dissolved | Solids<br>Dissolved<br>(Calculated) |
|---------|----------------------------------|------------------------------------|------------------------------------|--|---|------------------------------------|---|-------------------------------------|
| Date    | mg/L                             |                                    | mg/L                               | mg/L   | mg/L  | mg/L                               | mg/L  | mg/L                                |
| Jan. 20 | 150                              | 3.7                                | 5.1                                | 120  | 280   | 190                                | 12  | 815                                 |
| Feb. 17 | 260                              | 5.1                                | 5.5                                | 160  | 400   | 330                                | 11  | 1,270                               |
| Mar. 17 | 160                              | 4.0                                | 4.8                                | 120  | 280   | 190                                | 9.9   | 824                                 |
| Apr. 21 | 120                              | 3.2                                | 5.1                                | 110  | 260   | 120                                | 11  | 677                                 |
| May 21  | 120                              | 3.2                                | 4.7                                | 110  | 250   | 130                                | 11  | 670                                 |
| June 16 | 120                              | 3.2                                | 4.5                                | 110  | 220   | 120                                | 12  | 635                                 |
| July 28 | 110                              | 3.0                                | 4.6                                | 120  | 230   | 120                                | 12  | 649                                 |
| Aug. 17 | 110                              | 3.2                                | 5.1                                | 110  | 220   | 100                                | 11  | 601                                 |
| Sep. 17 | 110                              | 3.2                                | 4.6                                | 110  | 230   | 110                                | 11  | 624                                 |
| Oct. 13 | 110                              | 3.1                                | 4.5                                | 110  | 230   | 130                                | 11  | 645                                 |
| Nov. 18 | 120                              | 3.3                                | 4.9                                | 120  | 240   | 140                                | 12  | 692                                 |
| Dec. 14 | 120                              | 3.3                                | 4.8                                | 120  | 240   | 140                                | 12  | 688                                 |

**QUALITY OF WATER - 1981****Rio Grande below Anzalduas Dam near Reynosa, Tamaulipas and Mission, Texas**

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMhos/cm @ 25 DEG C - 1981

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,270 | 1,720 | 1,170 | 1,410 | 1,080 | 1,050 | 1,000 | 1,010 | 1,240 | 971   | 948   | 1,130 |
| 2   | 1,280 | 1,740 | 1,180 | 1,320 | 1,050 | 1,030 | 1,000 | 1,050 | 1,180 | 1,010 | 1,150 | 1,140 |
| 3   | 1,310 | 1,800 | 1,210 | 1,220 | 1,060 | 1,090 | 1,010 | 1,060 | 1,200 | 1,030 | 967   | 1,180 |
| 4   | 1,310 | 1,860 | 1,290 | 1,180 | 1,150 | 1,050 | 949   | 1,080 | 1,070 | 990   | 1,030 | 1,170 |
| 5   | 1,410 | 1,910 | 1,320 | 1,200 | 1,020 | 1,110 | 934   | 1,030 | 963   | 1,000 | 1,070 | 1,180 |
| 6   | 1,450 | 1,930 | 1,320 | 1,200 | 763   | 1,120 | 931   | 1,040 | 1,220 | 1,030 | 1,140 | 1,130 |
| 7   | 1,600 | 1,950 | 1,360 | 1,150 | 1,010 | 1,090 | 968   | 1,000 | 1,220 | 1,010 | 1,150 | 1,150 |
| 8   | 1,870 | 1,980 | 1,310 | 1,120 | 1,070 | 1,110 | 940   | 1,050 | 1,130 | 993   | 1,180 | 1,170 |
| 9   | 1,900 | 2,010 | 1,310 | 1,130 | 1,060 | 1,020 | 953   | 952   | 1,010 | 1,050 | 1,230 | 1,170 |
| 10  | 1,500 | 2,030 | 1,300 | 1,150 | 1,130 | 1,030 | 921   | 956   | 1,060 | 1,110 | 1,280 |       |
| 11  | 1,250 | 2,010 | 1,300 | 1,120 | 1,090 | 1,110 | 974   | 920   | 930   | 1,100 | 1,390 | 1,180 |
| 12  | 1,160 |       | 1,330 | 1,090 | 1,090 | 1,110 | 924   | 938   | 917   | 1,020 | 1,480 | 1,150 |
| 13  | 1,090 | 2,070 | 1,380 | 1,090 | 1,060 | 1,100 | 898   | 952   | 905   | 972   | 1,340 | 1,160 |
| 14  | 1,090 | 2,160 | 1,400 | 1,080 | 1,060 | 1,130 | 891   | 972   | 918   | 957   | 1,160 | 1,160 |
| 15  | 1,100 | 2,160 | 1,360 | 1,090 | 1,070 | 1,130 | 895   | 945   | 917   | 942   | 1,160 | 1,120 |
| 16  | 1,120 | 2,070 | 1,330 | 1,070 | 1,070 | 1,080 | 930   | 1,020 | 940   | 928   | 1,140 | 1,110 |
| 17  | 1,150 | 2,030 | 1,330 | 1,070 | 1,080 | 1,060 | 970   | 966   | 985   | 923   | 1,140 | 1,160 |
| 18  | 1,150 | 2,020 | 1,310 | 1,060 | 1,070 | 870   | 1,030 | 989   | 974   | 939   | 1,150 | 1,170 |
| 19  | 1,180 | 2,040 | 1,300 | 1,050 | 1,050 | 842   | 1,120 | 990   | 924   | 1,010 | 1,160 | 1,160 |
| 20  | 1,260 | 1,890 | 1,290 | 1,050 | 1,070 | 1,000 | 1,160 | 984   | 973   | 990   | 1,150 | 1,160 |
| 21  | 1,320 | 1,390 | 1,280 |       | 1,070 | 1,040 | 1,280 | 999   | 912   | 1,020 | 1,150 | 1,170 |
| 22  | 1,400 | 1,180 | 1,290 | 980   | 1,070 | 1,040 | 1,140 | 979   | 906   | 1,050 | 1,150 | 1,170 |
| 23  | 1,460 | 1,160 | 1,360 | 1,070 | 1,080 | 1,060 | 1,110 | 1,040 | 919   | 1,160 | 1,170 | 1,150 |
| 24  | 1,660 | 1,150 | 1,510 | 1,100 | 1,080 | 1,060 | 1,100 | 1,060 | 914   | 1,090 | 1,200 | 1,170 |
| 25  | 1,850 | 1,140 | 1,710 | 1,160 | 1,080 | 1,050 | 1,120 | 1,130 | 905   | 972   | 1,170 | 1,180 |
| 26  | 1,860 | 1,150 | 2,120 | 1,110 | 1,090 | 1,040 | 1,070 | 1,130 | 903   | 968   | 1,190 | 1,180 |
| 27  | 1,860 | 1,150 | 2,500 | 1,110 | 1,080 | 1,030 | 1,080 | 1,050 | 908   | 964   | 1,170 | 1,160 |
| 28  | 1,800 | 1,160 | 2,400 | 1,150 | 1,110 | 1,010 | 1,090 | 1,050 | 906   | 949   | 1,210 | 1,150 |
| 29  | 1,760 |       | 1,990 | 1,080 | 1,110 | 999   | 1,070 | 1,040 | 911   | 938   | 1,160 | 1,150 |
| 30  | 1,720 |       | 1,770 | 1,150 | 1,120 | 1,010 | 1,070 | 1,070 | 919   | 933   | 1,140 | 1,160 |
| 31  | 1,700 |       | 1,560 |       | 889   |       |       | 1,060 | 1,350 | 943   |       | 1,170 |

**QUALITY OF WATER - 1981**

**Rio Grande at Mercedes Irrigation District Pumps  
Near Mercedes, Texas and Rio Rico, Tamaulipas**

**LOCATION:** At river mile 117.8 (189.5 km), 52.6 river miles (84.6 km) downstream from Anzalduas Dam.

**RECORDS:** Specific conductance, 1945 through 1981.

**REMARKS:** Sampling and determinations by the International Boundary and Water Commission.

**SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981**

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,580 | 2,050 | 1,440 | 2,050 | 1,240 | 1,060 | 1,020 | 1,080 | 1,270 | 929   | 1,010 | 1,220 |
| 2   | 1,560 | 2,050 | 1,450 | 1,960 | 1,170 | 1,090 | 1,010 | 1,090 | 1,310 | 947   | 1,020 | 1,200 |
| 3   | 1,560 | 2,050 | 1,530 | 1,720 | 1,160 | 1,050 | 1,010 | 988   | 1,310 | 996   | 1,030 | 1,200 |
| 4   | 1,560 | 2,060 | 1,500 | 1,550 | 1,160 | 1,080 | 1,000 | 1,070 | 1,270 | 997   | 1,010 | 1,210 |
| 5   | 1,570 | 2,050 | 1,420 | 1,500 | 1,120 | 1,110 | 960   | 1,090 | 1,130 | 997   | 1,050 | 1,230 |
| 6   | 1,610 | 2,090 | 1,490 | 1,390 | 1,040 | 1,120 | 976   | 1,120 | 1,130 | 1,020 | 1,060 | 1,280 |
| 7   | 1,550 | 2,100 | 1,520 | 1,350 | 803   | 1,110 | 930   | 1,120 | 1,130 | 1,040 | 1,110 | 1,290 |
| 8   | 1,570 | 2,090 | 1,590 | 1,320 | 941   | 1,110 | 948   | 1,040 | 1,250 | 1,050 | 1,170 | 1,160 |
| 9   | 1,570 | 2,150 | 1,550 | 1,250 | 1,070 | 1,110 | 948   | 1,030 | 1,200 | 1,050 | 1,190 | 1,190 |
| 10  | 1,770 | 2,210 | 1,510 | 1,210 | 1,080 | 1,040 | 957   | 1,010 | 1,010 | 1,040 | 1,310 | 1,220 |
| 11  | 1,990 | 2,220 | 1,440 | 1,220 | 1,080 | 1,050 | 939   | 1,000 | 1,000 | 1,090 | 1,320 | 1,230 |
| 12  | 1,590 | 2,290 | 1,420 | 1,220 | 1,080 | 1,090 | 953   | 1,000 | 998   | 1,140 | 1,310 | 1,240 |
| 13  | 1,420 | 2,250 | 1,470 | 1,170 | 1,070 | 1,180 | 952   | 991   | 998   | 1,080 | 1,420 | 1,230 |
| 14  | 1,420 | 2,210 | 1,510 | 1,150 | 1,090 | 1,160 | 931   | 985   | 999   | 991   | 1,210 | 1,200 |
| 15  | 1,430 | 2,210 | 1,520 | 1,140 | 1,080 | 1,200 | 922   | 984   | 918   | 971   | 1,200 | 1,180 |
| 16  | 1,410 | 2,230 | 1,520 | 1,130 | 1,080 | 1,140 | 908   | 992   | 919   | 952   | 1,200 | 1,150 |
| 17  | 1,450 | 2,190 | 1,530 | 1,130 | 1,090 | 1,110 | 959   | 1,000 | 938   | 936   | 1,160 | 1,190 |
| 18  | 1,460 | 2,380 | 1,550 | 1,140 | 1,090 | 1,030 | 974   | 1,070 | 963   | 930   | 1,170 | 1,220 |
| 19  | 1,450 | 2,100 | 1,590 | 1,130 | 1,060 | 846   | 1,010 | 1,020 | 972   | 936   | 1,210 | 1,230 |
| 20  | 1,480 | 2,080 | 1,700 | 1,120 | 1,050 | 826   | 1,060 | 1,020 | 972   | 940   | 1,220 |       |
| 21  | 1,500 | 2,180 | 1,700 | 1,090 | 1,080 | 1,020 | 1,140 | 1,020 | 978   | 1,020 | 1,190 | 1,190 |
| 22  | 1,500 | 1,640 | 1,700 | 1,040 | 1,090 | 1,040 | 1,200 | 1,030 | 917   | 1,030 | 1,190 | 1,180 |
| 23  | 1,550 | 1,630 | 1,740 | 1,070 | 1,070 | 1,040 | 1,340 | 1,010 | 916   | 1,060 | 1,190 | 1,210 |
| 24  | 1,600 | 1,280 | 1,860 | 1,090 | 1,080 | 1,060 | 1,160 | 1,020 | 926   | 1,060 | 1,220 | 1,200 |
| 25  | 1,600 | 1,240 | 1,970 | 1,060 | 1,080 | 1,050 | 1,110 | 1,050 | 930   | 1,090 | 1,230 | 1,190 |
| 26  | 1,640 | 1,280 | 1,730 | 1,200 | 1,090 | 1,050 | 1,100 | 1,090 | 911   | 1,010 | 1,260 | 1,190 |
| 27  | 1,750 | 1,440 | 1,800 | 1,200 | 1,100 | 1,060 | 1,080 | 1,170 | 909   | 1,010 | 1,250 | 1,210 |
| 28  | 1,900 | 1,440 | 1,940 | 1,210 | 1,110 | 1,050 | 1,080 | 1,130 | 911   | 1,020 | 1,230 | 1,190 |
| 29  | 2,090 |       | 2,660 | 1,200 | 1,100 | 1,050 | 1,110 | 1,140 | 909   | 955   | 1,310 | 1,160 |
| 30  | 2,070 |       | 2,710 | 1,200 | 1,020 | 1,020 | 1,090 | 1,130 | 928   | 945   | 1,310 | 1,180 |
| 31  | 2,050 |       | 2,340 |       | 1,020 |       | 1,080 | 1,090 |       | 1,040 |       | 1,210 |

## QUALITY OF WATER - 1981

## Rio Grande near Brownsville, Texas and Matamoros, Tamaulipas

**LOCATION:** Gaging station at river mile 48.7 (78.3 km), 0.2 river mile (0.3 km) downstream from El Jardin pumping plant and 7.0 river miles (11.2 km) downstream from the international highway bridge between Brownsville, Texas and Matamoros, Tamaulipas.

**RECORDS:** Chemical and biochemical analyses, October 1967 through January 1968 and October 1974 through 1981; biochemical, December 1976 through 1981; specific conductance, 1955 through 1981; suspended silt, 1955 through 1977.

**REMARKS:** Sampling and analyses by the U. S. Geological Survey. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey. Sampling and determinations for specific conductance prior to 1978 by the International Boundary and Water Commission.

| 1981<br>Date | Time<br>Std. | Stream-<br>flow,<br>Momen-<br>tary<br>Sec.-Ft. | Specific<br>Conduct-<br>ance<br>Micromhos | pH<br>Units | Temper-<br>ature<br>Deg C | Hard-<br>ness,<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Hard-<br>ness,<br>Noncar-<br>bonate<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion<br>(Ca),<br>Dis-<br>solved<br>mg/L | Magne-<br>sium<br>ion<br>(Mg)<br>mg/L | Sodium<br>ion<br>(Na),<br>Dis-<br>solved<br>mg/L | Sodium<br>Adso-<br>ption<br>Ratio<br>(SAR) | Potassium<br>ion (K),<br>Dissolved<br>mg/L |
|--------------|--------------|--|---|-------------|---------------------------|---|---|---|---------------------------------------|--|--|--|
| Jan. 15      | 1335         | 341  | 1,620                                     | 8.3         | 16.0                      | 410   | 230   | 110   | 33                                    | 190  | 4.1  | 5.5  |
| Feb. 19      | 1530         | 351  | 2,050                                     | 7.9         | 19.5                      | 550   | 340   | 150   | 42                                    | 250  | 4.7  | 6.1  |
| Mar. 18      | 0820         | 315  | 1,470                                     | 8.2         | 19.5                      | 350   | 220   | 92  | 28                                    | 170  | 4.0  | 5.2  |
| Apr. 8       | 0930         | 50.9   | 1,930                                     | 8.1         | 23.5                      | 480   | 290   | 130   | 37                                    | 220  | 4.4  | 6.2  |
| May 13       | 1200         | 9,990  | 1,070                                     | 7.7         | 25.0                      | 270   | 160   | 75  | 20                                    | 120  | 3.2  | 4.8  |
| June 17      | 1330         | 2,680  | 1,180                                     | 8.1         | 31.0                      | 290   | 180   | 78  | 22                                    | 140  | 3.6  | 5.1  |
| July 15      | 0950         | 11,700   | 878                                       | 7.9         | 29.0                      | 240   | 140   | 68  | 17                                    | 87   | 2.4  | 4.3  |
| Aug. 19      | 0800         | 424  | 1,040                                     | 8.1         | 30.5                      | 290   | 150   | 80  | 22                                    | 110  | 3.0  | 5.1  |
| Sep. 16      | 1120         | 464  | 890                                       | 8.2         | 29.0                      | 230   | 130   | 64  | 18                                    | 93   | 2.8  | 5.1  |
| Oct. 22      | 0955         | 1,350  | 962                                       | 8.3         | 25.0                      | 250   | 140   | 68  | 19                                    | 96   | 2.8  | 4.6  |
| Nov. 2       | 1135         | 1,200  | 1,230                                     | 8.3         | 22.0                      | 330   | 190   | 89  | 25                                    | 130  | 3.4  | 5.2  |

| 1981<br>Date | Alka-<br>linity<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion<br>(SO <sub>4</sub> ),<br>Dis-<br>solved<br>mg/L | Chlo-<br>ride<br>ion<br>(Cl),<br>Dis-<br>solved<br>mg/L | Silica<br>(SiO <sub>2</sub> ),<br>Dis-<br>solved<br>mg/L | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>Cols./<br>100 mL | Oxygen<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>5 Day<br>mg/L | Tur-<br>bidity<br>NTU | Solids,<br>Dis-<br>solved<br>(Calcu-<br>lated)<br>mg/L | Solids<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Sus-<br>pended<br>Sediment<br>mg/L |
|--------------|--|---|---|--|---|---|---|-----------------------|--|---|------------------------------------|
| Jan. 15      | 180  | 310   | 230   | 11   | 123                                       | 220   | 3.8   | 1.4                   | 999  | 1,010   | 74                                 |
| Feb. 19      | 210  | 370   | 330   | 12   | 106                                       | 270   | 3.8   | 34                    | 1,280  | 1,290   | 116                                |
| Mar. 18      | 130  | 300   | 220   | 10   | 106                                       | 490   | 3.6   | 50                    | 904  | 922   | 93                                 |
| Apr. 8       | 190  | 340   | 300   | 14   | 93  | 22  | 2.6   | 50                    | 1,160  | 1,240   | 109                                |
| May 13       | 110  | 260   | 130   | 10   | 73  | 300   | 1.8   | 380                   | 682  | 688   | 798                                |
| June 17      | 110  | 260   | 160   | 12   | 80  |   | 3.9   | 120                   | 750  | 742   | 481                                |
| July 15      | 100  | 200   | 97  | 11   | 81  | 620   | 1.6   | 150                   | 539  | 560   | 520                                |
| Aug. 19      | 140  | 230   | 120   | 14   | 91  | 180   | 2.0   | 19                    | 666  | 659   | 49                                 |
| Sept. 16     | 100  | 200   | 99  | 11   | 79  | 670   | 1.0   |                       | 549  | 540   | 536                                |
| Oct. 22      | 110  | 220   | 100   | 11   | 96  | 100   | 2.0   | 56                    | 579  | 602   |                                    |
| Nov. 2       | 140  | 250   | 170   | 12   | 101                                       | 44  | 2.3   | 32                    | 760  | 792   |                                    |

## QUALITY OF WATER - 1981

Rio Grande near Brownsville, Texas and Matamoros, Tamaulipas

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1981

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,590 | 1,590 | 1,450 | 1,860 | 1,190 | 1,090 | 1,000 | 1,060 | 1,230 | 908   | 930   | 1,260 |
| 2   | 1,620 | 1,630 | 1,420 | 1,820 | 1,170 | 1,080 | 990   | 1,080 | 1,210 | 909   | 950   | 1,260 |
| 3   | 1,600 | 1,680 | 1,360 | 1,860 | 1,150 | 1,080 | 980   | 1,050 | 1,280 | 940   | 970   | 1,250 |
| 4   | 1,550 | 1,650 | 1,390 | 1,870 | 1,050 | 1,070 | 970   | 1,040 | 1,300 | 1,050 | 990   | 1,170 |
| 5   | 1,500 | 1,640 | 1,500 | 1,830 | 1,190 | 1,070 | 960   | 1,020 | 1,250 | 1,040 | 1,010 | 1,200 |
| 6   | 1,540 | 1,840 | 1,490 | 1,880 | 1,080 | 1,070 | 950   | 1,030 | 1,200 | 1,020 | 1,030 | 1,200 |
| 7   | 1,680 | 2,060 | 1,480 | 1,890 | 1,080 | 1,080 | 940   | 1,000 | 1,150 | 993   | 1,040 | 1,200 |
| 8   | 1,690 | 2,060 | 1,520 | 1,900 | 870   | 1,100 | 930   | 990   | 1,090 | 1,050 | 1,050 | 1,200 |
| 9   | 1,710 | 2,020 | 1,520 | 1,920 | 751   | 1,040 | 920   | 980   | 1,030 | 1,060 | 1,050 | 1,180 |
| 10  | 1,680 | 2,000 | 1,450 | 2,000 | 800   | 1,050 | 910   | 984   | 1,220 | 1,070 | 1,090 | 1,200 |
| 11  | 1,750 | 1,920 | 1,350 | 1,940 | 825   | 1,060 | 900   | 982   | 1,120 | 1,060 | 1,110 | 1,200 |
| 12  | 1,680 | 1,990 | 1,280 | 2,050 | 850   | 1,080 | 890   | 980   | 956   | 1,050 | 1,140 | 1,160 |
| 13  | 1,710 | 2,040 | 1,540 | 2,070 | 900   | 1,100 | 885   | 973   | 930   | 950   | 1,170 | 1,200 |
| 14  | 1,660 | 2,020 | 1,430 | 2,280 | 950   | 1,100 | 880   | 971   | 908   | 950   | 1,230 | 1,240 |
| 15  | 1,540 | 2,110 | 1,450 | 2,290 | 1,000 | 1,110 | 878   | 976   | 905   | 950   | 1,260 | 1,230 |
| 16  | 1,790 | 2,100 | 1,500 | 2,350 | 1,010 | 900   | 880   | 980   | 890   | 950   | 1,400 | 1,220 |
| 17  | 1,500 | 2,120 | 1,480 | 2,450 | 1,020 | 880   | 890   | 991   | 900   | 950   | 1,380 | 1,190 |
| 18  | 1,350 | 2,070 | 1,480 | 2,500 | 1,010 | 890   | 895   | 1,020 | 886   | 924   | 1,280 | 1,150 |
| 19  | 1,300 | 1,960 | 1,430 | 2,850 | 1,020 | 900   | 900   | 1,040 | 931   | 920   | 1,110 | 1,160 |
| 20  | 1,270 | 1,970 | 1,460 | 1,800 | 1,030 | 930   | 910   | 1,050 | 980   | 921   | 1,180 | 1,180 |
| 21  | 1,240 | 2,190 | 1,510 | 1,410 | 1,040 | 950   | 920   | 1,060 | 1,000 | 940   | 1,180 | 1,210 |
| 22  | 1,260 | 2,080 | 1,520 | 1,290 | 1,050 | 980   | 930   | 1,050 | 960   | 980   | 1,180 | 1,180 |
| 23  | 1,220 | 2,050 | 1,590 | 1,270 | 1,060 | 1,030 | 940   | 1,060 | 899   | 1,000 | 1,180 | 1,190 |
| 24  | 1,280 | 2,080 | 1,620 | 1,180 | 1,070 | 1,020 | 950   | 1,070 | 932   | 1,040 | 1,200 | 1,200 |
| 25  | 1,360 | 1,820 | 1,670 | 1,150 | 1,060 | 1,040 | 960   | 1,080 | 936   | 1,040 | 1,200 | 1,200 |
| 26  | 1,400 | 1,540 | 1,680 | 1,120 | 1,070 | 1,030 | 970   | 1,090 | 926   | 929   | 1,200 | 1,200 |
| 27  | 1,490 | 1,430 | 1,760 | 1,130 | 1,080 | 1,030 | 980   | 1,100 | 910   | 922   | 1,190 | 1,190 |
| 28  | 1,450 | 1,440 | 1,770 | 1,210 | 1,070 | 1,020 | 990   | 1,100 | 911   | 925   | 1,220 | 1,200 |
| 29  | 1,510 |       | 1,800 | 1,160 | 1,080 | 1,010 | 1,000 | 1,110 | 900   | 923   | 1,200 | 1,200 |
| 30  | 1,540 |       | 1,810 | 1,210 | 1,080 | 1,000 | 1,020 | 1,130 | 888   | 923   | 1,200 | 1,190 |
| 31  | 1,540 |       | 1,820 |       | 1,090 |       |       | 1,040 | 1,150 | 921   |       | 1,190 |

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

Tabulated below, in approximate downstream order, are monthly records of United States rainfall stations with averages for their periods of record. With the exception of Las Cruces, New Mexico, all stations are located in Texas. For location, elevation, period of record, type of gage in use, watershed subdivision in which the station is located, and the observer, see alphabetical listing of these stations shown on pages 138 through 140 in this bulletin. These rainfall records have not been published elsewhere. Records of daily rainfall amounts, where available, are on file in the office of the United States Section of the Commission. Daily records for years prior to 1953 may also be found in corresponding water bulletins.

Detailed listings of the months and years for which records are available through 1970 may be found under "Index to Precipitation Records" in Water Bulletins 10, 14, 26, and Supplement 40A.

| Month  | Las Cruces,<br>New Mexico |         | American<br>Dam |         | Clint<br>Station |         | Acala<br>Station |         | Port Hancock<br>Bridge |         |
|--------|---------------------------|---------|-----------------|---------|------------------|---------|------------------|---------|------------------------|---------|
|        | 1981                      | Average | 1981            | Average | 1981             | Average | 1981             | Average | 1981                   | Average |
| Jan.   | 0.98                      | 0.72    | 1.08            | 0.43    | 0.93             | 0.32    |                  | 0.30    | 0.98                   | 0.38    |
| Feb.   | .25                       | .40     | .36             | .39     | .25              | .28     |                  | .20     | .35                    | .30     |
| Mar.   | .28                       | .24     | .46             | .32     | .26              | .21     |                  | .24     | .40                    | .24     |
| Apr.   | .62                       | .36     | 1.31            | .22     | .31              | .14     | 0.32             | .19     | .57                    | .26     |
| May    | .70                       | .63     | 1.01            | .26     | .35              | .30     | .38              | .35     | .97                    | .49     |
| June   | 2.34                      | .89     | .03             | .54     | .30              | .50     | .27              | .59     | .71                    | .82     |
| July   | .88                       | 1.09    | 1.94            | 1.51    | .53              | 1.02    | .07              | 1.05    | 1.34                   | 1.30    |
| Aug.   | 3.54                      | 2.84    | 3.07            | 1.38    | 3.01             | 1.16    | .17              | 1.20    | 2.24                   | 1.65    |
| Sept.  | 1.61                      | 1.63    | .40             | 1.13    | 1.18             | .88     | 0                | .86     | 3.31                   | 1.46    |
| Oct.   | .63                       | .86     | .34             | .72     | .37              | .64     | .15              | .82     | .19                    | .95     |
| Nov.   | .84                       | .77     | .35             | .28     | .06              | .23     | .08              | .26     | .02                    | .35     |
| Dec.   | .02                       | .46     | .01             | .37     | .07              | .34     | .06              | .32     | .03                    | .39     |
| Yearly | 12.69                     | 10.89   | 10.36           | 7.55    | 7.62             | 6.02    |                  | 6.38    | 11.11                  | 8.59    |

| Month  | Guayuco<br>Arroyo |         | Fort<br>Quitman |         | Neely<br>Ranch |         | 96 Ranch<br>Headquarters |         | La Macolla<br>Farm |         |
|--------|-------------------|---------|-----------------|---------|----------------|---------|--------------------------|---------|--------------------|---------|
|        | 1981              | Average | 1981            | Average | 1981           | Average | 1981                     | Average | 1981               | Average |
| Jan.   | 0.50              | 0.29    | 0.13            | 0.35    | 1.18           | 0.34    | 1.40                     | 0.62    | 0.56               | 0.33    |
| Feb.   | .45               | .20     | .12             | .23     | .34            | .19     | .90                      | .57     | .57                | .42     |
| Mar.   | .16               | .21     | .25             | .21     | .40            | .18     | .30                      | .27     | .68                | .17     |
| Apr.   | .36               | .20     | .20             | .22     | .49            | .16     | .80                      | .15     | 3.52               | .82     |
| May    | .02               | .43     | .03             | .39     | .40            | .36     | 1.10                     | 1.18    | .67                | .77     |
| June   | 1.53              | .58     | .36             | .75     | 1.73           | .79     | 3.00                     | 1.94    | 2.61               | 1.45    |
| July   | .18               | 1.36    | .45             | 1.46    | 1.72           | 1.72    | 1.40                     | 4.63    | 1.40               | 1.57    |
| Aug.   | .88               | 1.66    | .19             | 1.56    | 2.06           | 1.78    | 4.30                     | 3.21    | 3.44               | 3.43    |
| Sept.  | 1.10              | 1.24    | .23             | 1.03    | 1.03           | 1.63    | 2.40                     | 5.19    | 4.82               | 3.04    |
| Oct.   | .19               | .97     | .04             | .79     | .82            | 1.00    | 2.10                     | 1.21    | 2.71               | 1.24    |
| Nov.   | 0                 | .22     | 0               | .28     | 0              | .26     | 0                        | .53     | 0                  | .40     |
| Dec.   | 0                 | .34     | 0               | .34     | 0              | .39     | 0                        | .52     | 0                  | .10     |
| Yearly | 5.37              | 7.70    | 2.00            | 7.61    | 10.17          | 8.80    | 17.70                    | 20.02   | 20.98              | 13.74   |

| Month  | Bill Shannon<br>Ranch |         | Adobes<br>Ranch |         | Shafter |         | Presidio<br>(IB&WC Gage) |         | Quebec<br>Ranch |         |
|--------|-----------------------|---------|-----------------|---------|---------|---------|--------------------------|---------|-----------------|---------|
|        | 1981                  | Average | 1981            | Average | 1981    | Average | 1981                     | Average | 1981            | Average |
| Jan.   | 1.00                  | 0.44    |                 | 0.32    | 0.70    | 0.14    | 0.86                     | 0.26    | 0               | 0.40    |
| Feb.   | .50                   | .37     |                 | .23     | .06     | .31     | .01                      | .19     | 1.00            | .34     |
| Mar.   | .90                   | .34     |                 | .17     | .68     | .35     | .60                      | .18     | 0               | .27     |
| Apr.   | 3.80                  | .31     |                 | .11     | 5.74    | .77     | 1.91                     | .26     | 3.40            | .34     |
| May    | .90                   | .72     |                 | .66     | .95     | .86     | 1.46                     | .51     | 1.00            | .81     |
| June   | 2.55                  | 1.59    | 2.30            | 1.34    | 2.23    | 2.54    | 2.17                     | 1.25    | 6.50            | 1.76    |
| July   | .90                   | 2.24    | 3.70            | 2.09    | 3.20    | 3.67    | 1.64                     | 1.51    | 5.15            | 2.69    |
| Aug.   | 5.75                  | 2.71    | 2.10            | 1.83    | 2.21    | 3.46    | 3.35                     | 1.40    | 3.46            | 2.50    |
| Sept.  | 6.60                  | 2.81    | 3.25            | 2.26    | 3.79    | 3.96    | 1.86                     | 1.54    | 1.00            | 2.50    |
| Oct.   | 3.70                  | 1.26    | 2.70            | .76     | 3.63    | 1.39    | 3.08                     | .75     | 2.80            | 1.01    |
| Nov.   | 0                     | .44     | 0               | .25     | 0       | .39     | 0                        | .29     | 0               | .30     |
| Dec.   | 0                     | .37     | 0               | .25     | 0       | .22     | .01                      | .24     | 0               | .33     |
| Yearly | 26.60                 | 13.60   |                 | 10.27   | 23.19   | 18.06   | 16.95                    | 8.38    | 24.25           | 13.25   |

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

| Month  | Kerr Mitchell Ranch |         | Plata |         | La Mota Ranch |         | Redford |         | Study Butte |         |
|--------|---------------------|---------|-------|---------|---------------|---------|---------|---------|-------------|---------|
|        | 1981                | Average | 1981  | Average | 1981          | Average | 1981    | Average | 1981        | Average |
| Jan.   | 1.00                | 0.46    | 0.25  | 0.21    | 1.00          | 0.67    | 0.50    | 0.28    | 2.82        | 0.80    |
| Feb.   | .31                 | .34     | 1.30  | .41     | 0             | .08     | T       | .19     | .03         | .11     |
| Mar.   | .99                 | .21     | 0     | 0       | 1.03          | .33     | 0       | .21     | .26         | .10     |
| Apr.   | 1.82                | .45     | 2.67  | .78     | 4.90          | .79     | 2.40    | .32     | 1.55        | .56     |
| May    | 1.75                | 1.07    | .66   | .28     | 1.42          | 1.06    | .40     | .46     | .55         | 1.13    |
| June   | 1.83                | 1.83    | 3.05  | 1.83    | 1.67          | 1.64    | .90     | 1.03    | 2.36        | 1.48    |
| July   | 1.90                | 2.04    | 1.25  | .69     | 1.02          | 1.37    | 1.80    | 1.47    | 1.33        | 1.63    |
| Aug.   | 2.40                | 2.34    | 2.78  | 2.86    | 2.23          | 1.95    | .80     | 1.35    | .58         | 1.94    |
| Sept.  | .65                 | 2.12    | .80   | 2.74    | 2.40          | 2.33    | 3.10    | 1.94    | 1.38        | 1.60    |
| Oct.   | 3.75                | 1.33    | 1.45  | 5.87    | .93           | 3.30    | .91     | 2.53    | .85         |         |
| Nov.   | 0                   | .36     | .61   | 0       | .39           | 0       | .34     | 0       | .22         |         |
| Dec.   | 0                   | .36     | 0     | 0       | .32           | 0       | 0       | 0       | 0           | .23     |
| Yearly | 16.40               | 12.91   |       | 11.86   | 21.54         | 11.86   | 13.20   | 8.72    | 13.39       | 10.65   |

| Month  | Terlingua Creek Station |         | Castolon |         | Johnson Ranch |         | J. F. Woodward Ranch |         | Yarborough Ranch |         |
|--------|-------------------------|---------|----------|---------|---------------|---------|----------------------|---------|------------------|---------|
|        | 1981                    | Average | 1981     | Average | 1981          | Average | 1981                 | Average | 1981             | Average |
| Jan.   | 1.40                    | 0.24    | 1.03     | 0.23    | 0.40          | 0.29    | 1.11                 | 0.44    | 0.54             | 0.24    |
| Feb.   | T                       | .20     | .02      | .29     | T             | .22     | .30                  | .37     | .70              | .43     |
| Mar.   | .10                     | .15     | .44      | .28     | .20           | .18     | 1.26                 | .27     | .89              | .28     |
| Apr.   | 2.70                    | .38     | 1.55     | .40     | 2.50          | .42     | 2.86                 | .58     | 1.49             | .37     |
| May    | .80                     | .70     | 1.45     | .96     | 1.90          | 1.02    | .93                  | 1.01    | .47              | .88     |
| June   | .75                     | 1.02    | 1.22     | 1.38    | .80           | 1.09    | 1.44                 | 1.86    | 3.11             | 1.82    |
| July   | 2.80                    | 1.22    | 1.24     | 1.92    | 1.00          | 1.17    | 3.17                 | 2.44    | 3.60             | 2.60    |
| Aug.   | 1.20                    | 1.23    | 1.20     | 1.86    | 2.65          | .92     | 5.57                 | 2.99    | 5.25             | 3.11    |
| Sept.  | 2.30                    | 1.38    | 3.35     | 2.17    | 2.10          | 1.41    | 1.56                 | 2.55    | 2.63             | 3.19    |
| Oct.   | 3.80                    | .76     | 2.87     | .89     | 3.85          | .70     | 5.83                 | 1.20    | 5.12             | 1.42    |
| Nov.   | 0                       | .20     | 0        | .26     | 0             | .21     | 0                    | .51     | 0                | .56     |
| Dec.   | 0                       | .26     | 0        | .26     | 0             | .28     | 0                    | .35     | 0                | .49     |
| Yearly | 15.85                   | 7.74    | 14.37    | 10.90   | 15.40         | 7.91    | 24.03                | 14.57   | 23.80            | 15.39   |

| Month  | Elephant Mountain Ranch |         | Buttrill Ranch |         | A. M. Potter Ranch |         | Harold Wynne Ranch Headquarters |         | Dove Mountain Ranch |         |
|--------|-------------------------|---------|----------------|---------|--------------------|---------|---------------------------------|---------|---------------------|---------|
|        | 1981                    | Average | 1981           | Average | 1981               | Average | 1981                            | Average | 1981                | Average |
| Jan.   | 0                       | 0.41    | 1.20           | 0.46    | 0                  | 0.31    | 0.60                            | 0.23    | 1.31                | 0.43    |
| Feb.   | 0                       | .30     | 0              | .18     | .64                | .48     | 0                               | .16     | 0                   | .36     |
| Mar.   | 0                       | .14     | .80            | .18     | .68                | .20     | 1.00                            | .29     | .80                 | .23     |
| Apr.   | 0                       | .43     | 2.20           | .57     | 1.20               | .28     | 1.10                            | .61     | 1.80                | .48     |
| May    | .60                     | .82     | 2.28           | 1.17    | 1.08               | .98     | .80                             | .99     | .75                 | 1.15    |
| June   | 3.20                    | 1.53    | 1.95           | 1.41    | .80                | 1.11    | 5.17                            | 1.67    | 1.63                | 1.13    |
| July   | 0                       | 1.67    | 2.57           | 1.55    | 1.86               | 1.50    | 1.30                            | 1.64    | .20                 | 1.69    |
| Aug.   | 6.25                    | 2.04    | 2.60           | 1.62    | .72                | 1.59    | 4.40                            | 3.49    | 1.80                | 1.27    |
| Sept.  | .70                     | 1.99    | .89            | 2.04    | 1.06               | 1.91    | 1.60                            | 2.17    | .50                 | 1.62    |
| Oct.   | 0                       | .97     | 6.65           | 1.10    | 4.84               | .76     | 7.90                            | 1.86    | 8.00                | 1.47    |
| Nov.   | 0                       | .30     | 0              | .28     | 1.30               | .44     | 0                               | .31     | 0                   | .33     |
| Dec.   | 0                       | .51     | 0              | .31     | 0                  | .42     | 0                               | .49     | 0                   | .38     |
| Yearly | 10.75                   | 11.11   | 21.14          | 10.87   | 14.18              | 9.98    | 23.87                           | 13.91   | 16.79               | 10.54   |

| Month  | Slaughter Ranch |         | Steve Stumberg Ranch |         | C. F. Cox Headquarters |         | McGonagill Ranch Headquarters |         | McGonagill East Mill |         |
|--------|-----------------|---------|----------------------|---------|------------------------|---------|-------------------------------|---------|----------------------|---------|
|        | 1981            | Average | 1981                 | Average | 1981                   | Average | 1981                          | Average | 1981                 | Average |
| Jan.   | 1.44            | 0.48    | 1.39                 | 0.48    | 1.68                   | 0.71    | 1.00                          | 0.29    | 1.00                 | 0.32    |
| Feb.   | .26             | .42     | .42                  | .39     | 0                      | .42     | .20                           | .44     | .20                  | .22     |
| Mar.   | 1.24            | .46     | .67                  | .40     | 1.10                   | .68     | 1.30                          | .44     | 1.10                 | .51     |
| Apr.   | 3.67            | .92     | 1.99                 | .71     | 2.00                   | 1.66    | 3.10                          | .56     | 2.70                 | .70     |
| May    | 2.24            | 1.69    | 1.82                 | 1.40    | 4.00                   | 2.26    | 2.50                          | 1.36    | 1.70                 | 1.25    |
| June   | 1.38            | 1.22    | 0                    | 1.61    | .70                    | 1.76    | 1.30                          | 1.92    | .50                  | 1.86    |
| July   | 1.82            | 1.05    | 2.04                 | 0       | .57                    | 2.20    | 2.26                          | 2.26    | 1.60                 | 1.61    |
| Aug.   | 2.49            | 2.84    | 2.39                 | 2.10    | 1.95                   | 5.20    | 2.05                          | 4.90    | 1.40                 | 2.44    |
| Sept.  | 1.54            | 1.50    | 5.60                 | 1.60    | 4.05                   | 2.65    | 5.80                          | 1.26    | 4.80                 | 1.23    |
| Oct.   | 1.02            | .61     | 0                    | .99     | 0                      | .33     | 0                             | 0       | .33                  |         |
| Nov.   | .48             | .52     | .52                  | .15     | 0                      | .16     | 0                             | 0       | .17                  |         |
| Dec.   |                 |         |                      |         |                        |         |                               |         |                      |         |
| Yearly |                 | 14.61   |                      | 14.06   | 18.78                  | 17.27   | 24.20                         | 13.72   | 19.90                | 12.61   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

| Month  | McGonagill Ranch<br>Big Peters Pasture |         | White V-<br>Ranch |         | Lewis James<br>Ranch |         | Dryden |         | Ross Foster<br>Ranch |         |
|--------|--|---------|-------------------|---------|----------------------|---------|--------|---------|----------------------|---------|
|        | 1981                                   | Average | 1981              | Average | 1981                 | Average | 1981   | Average | 1981                 | Average |
| Jan.   | 1.00                                   |         | 1.58              | 0.52    | 1.52                 | 0.37    | 0.90   | 0.49    | 1.00                 | 0.40    |
| Feb.   | .20                                    |         | .40               | .59     | .22                  | .53     | .21    | .51     | .42                  | .42     |
| Mar.   | 1.10                                   |         | 2.02              | .40     | 1.48                 | .40     |        |         | 1.20                 | .31     |
| Apr.   | 1.40                                   |         | 7.20              | 1.48    | 6.33                 | 1.21    |        |         | 7.55                 | 1.09    |
| May    | 3.50                                   |         | 1.77              | 1.47    | 2.30                 | 1.57    |        |         | 3.75                 | 1.27    |
| June   | .20                                    |         | .45               | 1.55    | .08                  | 1.10    |        |         | 1.12                 | .89     |
| July   | .40                                    |         | 2.05              | 1.28    | 1.52                 | 1.46    |        |         | 1.11                 | .66     |
| Aug.   | 6.00                                   |         | 2.25              | 1.72    | 3.96                 | 2.36    |        |         | 2.12                 | 1.36    |
| Sept.  | 1.00                                   |         | 1.30              | 2.88    | .36                  | 3.21    |        |         | 1.29                 | 1.78    |
| Oct.   | 5.20                                   |         | 4.20              | 1.66    | 4.18                 | 1.49    |        |         | .50                  | 1.04    |
| Nov.   | 0                                      |         | 0                 | .73     | 0                    | .77     |        |         | .44                  | .41     |
| Dec.   | 0                                      |         | 0                 | .37     | 0                    | .33     |        |         | .43                  | .30     |
| Yearly | 20.00                                  |         | 23.22             | 14.65   | 21.95                | 14.80   |        |         | 11.91                | 17.89   |
|        |  |         |                   |         |                      |         |        |         |                      | 10.27   |

| Month  | Billings<br>Ranch |         | W. A. Arledge<br>Ranch |         | Owens<br>Ranch |         | Latham<br>Ranch |         | Prosser Ranch<br>No. 3 |         |
|--------|-------------------|---------|------------------------|---------|----------------|---------|-----------------|---------|------------------------|---------|
|        | 1981              | Average | 1981                   | Average | 1981           | Average | 1981            | Average | 1981                   | Average |
| Jan.   |                   | 0.24    | 0.70                   | 0.61    | 1.10           | 0.39    | 0               | 0.35    | 0.27                   | 0.36    |
| Feb.   |                   | .50     | 0                      | .53     | 0              | .61     | 0               | .82     | .23                    | .74     |
| Mar.   | 2.00              | .90     | 1.57                   | .50     | 2.45           | 1.00    | 2.50            | .72     | 1.90                   | .66     |
| Apr.   | 8.80              | 2.64    | 8.93                   | 1.44    | 8.60           | 2.24    | 7.90            | 1.90    | 7.72                   | 1.68    |
| May    | 4.90              | 3.02    | 3.60                   | 1.86    | 3.10           | 2.05    | 2.80            | 2.84    | 4.38                   | 2.20    |
| June   | 2.00              | .90     | 1.25                   | 1.56    | 4.50           | 2.17    | 3.80            | 2.41    | 2.72                   | 1.34    |
| July   | 0                 | 1.52    | 0                      | 1.24    | .20            | 1.16    | 0               | 2.78    | .10                    | 1.58    |
| Aug.   | 3.60              | 3.08    | 5.47                   | 1.54    | 4.70           | 1.98    | 2.50            | 3.22    | 0                      | 2.17    |
| Sept.  | 0                 | 3.58    | .70                    | 2.05    | 2.50           | 2.74    | 2.50            | 3.99    | .78                    | 3.56    |
| Oct.   | 4.10              | 1.36    | 3.88                   | 1.60    | 4.20           | 2.24    | 8.00            | 2.15    | 11.20                  | 2.26    |
| Nov.   | 0                 | .85     | 0                      | .47     | 0              | 1.31    | .40             | .89     | 0                      | .64     |
| Dec.   | 0                 | .85     | 0                      | .48     | 0              | .47     | 0               | .47     | 0                      | .36     |
| Yearly |                   | 19.44   | 26.10                  | 13.88   | 31.35          | 18.36   | 30.40           | 22.54   | 29.30                  | 17.55   |

| Month  | Ranchita<br>(Continental) |         | Rio Grande<br>near Dryden |         | Pecos River<br>near Langtry Station |         | Dead Mans Canyon<br>near Comstock |         | Prosser Ranch<br>No. 1 |         |
|--------|---------------------------|---------|---------------------------|---------|-------------------------------------|---------|-----------------------------------|---------|------------------------|---------|
|        | 1981                      | Average | 1981                      | Average | 1981                                | Average | 1981                              | Average | 1981                   | Average |
| Jan.   | 0.60                      | 0.37    | 1.24                      | 0.42    | 0.70                                | 0.32    | 0.40                              | 0.35    | 0.38                   | 0.32    |
| Feb.   | .50                       | .75     | .12                       | .07     | .35                                 | .64     | .35                               | .65     | .32                    | .64     |
| Mar.   | 1.70                      | .72     | .66                       | .23     | 1.40                                | .58     | 1.45                              | .69     | 1.97                   | .57     |
| Apr.   | 6.15                      | 1.56    | 4.36                      | 1.33    | 6.90                                | 1.28    | 6.83                              | 1.50    | 5.86                   | 1.61    |
| May    | 2.85                      | 1.91    | 1.63                      | 1.16    | 2.75                                | 1.20    | 2.52                              | 1.97    | 2.65                   | 2.15    |
| June   | 1.90                      | 2.04    | .71                       | .71     | 3.10                                | 1.89    | 2.70                              | 2.18    | 4.00                   | 1.60    |
| July   | .10                       | 1.64    | .98                       | .85     | .60                                 | 1.54    | .95                               | 2.52    | .50                    | 2.22    |
| Aug.   | 1.70                      | 2.70    | 4.32                      | 2.56    | 1.80                                | 1.80    | .70                               | 2.05    | .10                    | 2.14    |
| Sept.  | 0                         | 2.78    | 4.64                      | 2.23    | 0                                   | 2.46    | .30                               | 2.69    | 1.60                   | 3.13    |
| Oct.   | 5.30                      | 2.18    | .38                       | .34     | 8.20                                | 1.62    | 6.10                              | 2.08    | 11.40                  | 2.20    |
| Nov.   | 0                         | .64     | .01                       | .81     | 0                                   | .71     | 0                                 | .77     | 0                      | .65     |
| Dec.   | 0                         | .48     | 0                         | .24     | 0                                   | .31     | 0                                 | .40     | .10                    | .35     |
| Yearly | 20.80                     | 17.77   | 19.05                     | 10.95   | 25.80                               | 14.35   | 22.30                             | 17.85   | 28.88                  | 17.58   |

| Month  | Continental<br>Ranch |         | Martin King<br>Ranch |         | Brothertown<br>Ranch |         | Walker<br>Ranch |         | Zuberbueler<br>Ranch |         |
|--------|----------------------|---------|----------------------|---------|----------------------|---------|-----------------|---------|----------------------|---------|
|        | 1981                 | Average | 1981                 | Average | 1981                 | Average | 1981            | Average | 1981                 | Average |
| Jan.   | 0.60                 | 0.51    | 0.59                 | 0.48    | 0.51                 | 0.61    | 0.42            | 0.32    | 0.64                 | 0.36    |
| Feb.   | .70                  | .89     | .20                  | .70     | .35                  | .82     | .15             | .61     | .47                  | .70     |
| Mar.   | 2.20                 | .73     | .74                  | .36     | 1.38                 | .59     | 1.79            | .61     | 1.43                 | .55     |
| Apr.   | 8.10                 | 1.79    | 6.04                 | 1.10    | 5.44                 | 1.16    | 5.42            | 1.41    | 5.79                 | 1.63    |
| May    | 5.10                 | 2.72    | .97                  | 1.49    | .85                  | 1.47    | 2.23            | 2.07    | 2.06                 | 1.71    |
| June   | 2.00                 | 1.94    | 3.22                 | 1.71    | 2.77                 | 1.86    | 4.46            | 2.15    | 3.39                 | 2.01    |
| July   | .20                  | 2.60    | .28                  | 1.50    | .64                  | 1.59    | .10             | 1.79    | 1.24                 | 2.83    |
| Aug.   | 1.90                 | 2.55    | .78                  | 1.62    | 0                    | 1.97    | .75             | 1.46    | 1.28                 | 1.54    |
| Sept.  | 0                    | 3.83    | .87                  | 2.58    | 0                    | 2.58    | .97             | 3.66    | .88                  | 1.84    |
| Oct.   | 6.70                 | 2.48    | 7.05                 | 2.24    | 4.37                 | 1.91    | 4.07            | 2.04    | 3.26                 | 1.35    |
| Nov.   | 0                    | .66     | 0                    | .55     | 0                    | .53     | 0               | .69     | 0                    | .72     |
| Dec.   | 0                    | .48     | 0                    | .43     | 0                    | .34     | 0               | .34     | 0                    | .51     |
| Yearly | 27.50                | 21.18   | 20.74                | 14.76   | 16.31                | 15.43   | 20.36           | 17.15   | 20.44                | 15.75   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

| Month  | P. W. Kelly Ranch |         | Comstock |         | Cow Creek near Comstock |         | Amistad Reservoir near Comstock |         | Feeley |         |
|--------|-------------------|---------|----------|---------|-------------------------|---------|---------------------------------|---------|--------|---------|
|        | 1981              | Average | 1981     | Average | 1981                    | Average | 1981                            | Average | 1981   | Average |
| Jan.   | 0.39              | 0.44    | 0.17     | 0.55    | 0.55                    | 0.32    | 0.27                            | 0.22    | 0.15   | 0.37    |
| Feb.   | .30               | .69     | .39      | .78     | .39                     | .51     | .45                             | .34     | .06    | .66     |
| Mar.   | .90               | .82     | 1.43     | .62     | 1.43                    | .46     | .35                             | .48     | 1.50   | .51     |
| Apr.   | 4.94              | 1.38    | 4.51     | 1.46    | 6.30                    | 1.40    | 7.61                            | 1.83    | 5.48   | 1.57    |
| May    | 1.95              | 2.01    | 1.78     | 1.82    | 1.50                    | 1.11    | 1.50                            | 1.22    | 1.62   | 1.75    |
| June   | 2.61              | 2.18    | 3.71     | 2.10    | 2.50                    | 1.56    | 5.20                            | 1.67    | 3.41   | 1.91    |
| July   | .77               | 2.23    | 1.03     | 1.37    | .60                     | 1.61    | .69                             | 1.37    | .19    | 1.43    |
| Aug.   | 1.36              | 2.12    | .96      | 1.88    | .26                     | 2.12    | .65                             | 1.96    | .26    | 2.02    |
| Sept.  | 1.18              | 3.08    | .33      | 2.36    | .07                     | 2.22    | .34                             | 1.76    | .07    | 2.14    |
| Oct.   | 4.29              | 1.84    | 3.02     | 1.85    | .70                     | 1.60    | 1.53                            | 1.80    | .60    | 1.96    |
| Nov.   | 0                 | .77     | 0        | .59     | 0                       | .57     | 0                               | .40     | 0      | .55     |
| Dec.   | 0                 | .30     | 0        | .62     | 0                       | .29     | 0                               | .22     | 0      | .34     |
| Yearly | 18.69             | 17.86   | 17.33    | 16.00   | 14.30                   | 13.77   | 18.59                           | 13.27   | 13.34  | 15.21   |

| Month  | Line Store |         | W. E. Sawyer Ranch |         | Whitehead Brothers Ranch |         | Prosser Ranch No. 2 |         | Devils River at Cauthorn Ranch |         |
|--------|------------|---------|--------------------|---------|--------------------------|---------|---------------------|---------|--------------------------------|---------|
|        | 1981       | Average | 1981               | Average | 1981                     | Average | 1981                | Average | 1981                           | Average |
| Jan.   | 1.26       | 0.55    | 0.34               | 0.36    | 0.60                     | 0.49    | 0.20                | 0.34    | 0.20                           | 0.39    |
| Feb.   | .28        | .88     | 0                  | .86     | .10                      | .66     | .37                 | .78     | 1.98                           | .71     |
| Mar.   | 2.69       | .75     | 2.91               | .99     | 1.35                     | .79     | 1.76                | .71     | 1.98                           | .71     |
| Apr.   | 5.56       | 2.01    | 5.22               | 2.12    | 4.29                     | 1.80    | 6.79                | 1.68    | 5.07                           | 1.64    |
| May    | 3.37       | 2.32    | 3.75               | 2.49    | 3.11                     | 2.47    | 3.31                | 2.31    | 5.88                           | 2.55    |
| June   | 1.36       | 1.79    | 2.49               | 2.04    | 6.53                     | 1.91    | 3.98                | 1.67    | 2.96                           | 1.32    |
| July   | .24        | 2.15    | .43                | 2.25    | .37                      | 1.94    | .25                 | 1.92    | .18                            | .37     |
| Aug.   | 3.05       | 2.61    | 4.69               | 3.14    | 5.30                     | 2.64    | T                   | 2.50    | 3.97                           | 1.25    |
| Sept.  | 0          | 3.80    | 0                  | 3.44    | 0                        | 2.94    | 1.26                | 3.53    | 2.83                           | 1.60    |
| Oct.   | 6.22       | 2.04    | 4.40               | 2.14    | 12.20                    | 3.17    | 9.12                | 2.19    | 11.67                          | 3.07    |
| Nov.   | 0          | .86     | .50                | .79     | 0                        | .87     | 0                   | .66     | 0                              | .28     |
| Dec.   | 0          | .39     | 0                  | .52     | 0                        | .40     | 0                   | .32     | 0                              | .34     |
| Yearly | 24.03      | 20.15   | 24.73              | 21.14   | 33.85                    | 20.08   | 27.04               | 18.61   |                                | 14.09   |

| Month  | Bakers Crossing |         | Erekson Ranch |         | Vinegarone |         | Eugene Miller Ranch |         | Dolan Springs |         |
|--------|-----------------|---------|---------------|---------|------------|---------|---------------------|---------|---------------|---------|
|        | 1981            | Average | 1981          | Average | 1981       | Average | 1981                | Average | 1981          | Average |
| Jan.   | 0.68            | 1.00    | 0.78          | 0.70    | 0.47       | 1.27    | 0.52                | 0.80    | 0.47          |         |
| Feb.   | 0.34            | .92     | 0             | 1.21    | .35        | .76     | .40                 | .46     | .15           | .72     |
| Mar.   | .71             | 1.25    | .92           | 1.50    | .87        | 1.66    | .85                 | 1.10    | .84           |         |
| Apr.   | 4.31            | 1.37    | 3.87          | 2.18    | 3.64       | 1.81    | 5.90                | 2.24    | 3.97          | 1.85    |
| May    | 2.22            | 2.53    |               | 2.57    | 4.26       | 2.59    | 4.92                | 3.56    | 1.78          | 2.17    |
| June   | 4.36            | 2.09    |               | 2.90    | 6.80       | 2.12    | 2.66                | 2.24    | 5.86          | 2.22    |
| July   | .37             | 1.68    |               | 2.35    | .28        | 2.27    | .80                 | 3.59    | .24           | 2.02    |
| Aug.   | 2.26            | 2.15    |               | 2.30    | 7.86       | 3.21    | 6.30                | 2.78    | .40           | .85     |
| Sept.  | 1.29            | 3.58    |               | 2.99    | .78        | 2.77    | 1.21                | 3.75    | 0             | 3.81    |
| Oct.   | 10.83           | 2.15    |               | 2.42    | 4.66       | 2.70    | 8.06                | 2.50    | 10.10         | 2.76    |
| Nov.   | 0               | .56     |               | .93     | 0          | .89     | .43                 | 1.01    | 0             | .72     |
| Dec.   | T               | .61     |               | .55     | 0          | .44     | 0                   | .34     | 0             | .40     |
| Yearly |                 | 19.03   |               | 22.10   | 30.83      | 20.90   | 33.61               | 23.84   | 24.40         | 20.83   |

| Month  | H. K. Fawcett Ranch |         | Ed Crane Ranch |         | H. T. Miers Ranch Headquarters |         | H. T. Miers Ranch No. 2 |         | A. A. Baker Ranch |         |
|--------|---------------------|---------|----------------|---------|--------------------------------|---------|-------------------------|---------|-------------------|---------|
|        | 1981                | Average | 1981           | Average | 1981                           | Average | 1981                    | Average | 1981              | Average |
| Jan.   | 0.50                | 0.65    | 0.58           | 0.75    | 0.50                           | 0.58    | 0.21                    | 0.45    | 0.58              | 0.39    |
| Feb.   | .45                 | .74     | .34            | 1.06    | .45                            | 1.00    | .43                     | .83     | .42               | .70     |
| Mar.   | 1.82                | .79     | 1.22           | .63     | 2.80                           | .83     | 2.80                    | 1.01    | 1.51              | .61     |
| Apr.   | 3.96                | 1.85    | 4.21           | 1.83    | 3.40                           | 1.98    | 3.88                    | 1.80    | 3.35              | 1.42    |
| May    | 2.09                | 2.31    | 2.76           | 2.55    | 1.00                           | 2.62    | 1.75                    | 2.43    | 1.97              | 1.68    |
| June   | 5.14                | 1.70    | 4.85           | 2.10    | 5.45                           | 2.79    | 6.98                    | 2.18    | 3.17              | 1.84    |
| July   | 1.64                | 1.77    | .51            | 1.86    | 1.00                           | 1.76    | 1.74                    | 1.55    | .52               | 1.59    |
| Aug.   | 1.56                | 2.37    | 1.10           | 1.16    | 2.85                           | 2.17    | 3.15                    | 2.72    | .75               | 2.05    |
| Sept.  | .02                 | 3.19    | 1.01           | 2.67    | T                              | 2.55    | T                       | 2.75    | .70               | 3.05    |
| Oct.   | 6.15                | 2.39    | 7.20           | 2.15    | 4.00                           | 2.79    | 5.55                    | 2.18    | 4.53              | 1.92    |
| Nov.   | 0                   | .70     | 0              | .76     | 0                              | .81     | 0                       | .80     | 0                 | .60     |
| Dec.   | 0                   | .45     | .02            | .61     | 0                              | .56     | 0                       | .58     | 0                 | .38     |
| Yearly | 23.33               | 18.91   | 23.80          | 18.13   | 21.45                          | 20.44   | 26.49                   | 19.28   | 17.50             | 16.23   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

| Month  | Harlow Ranch |         | Gillis Ranch |         | Goldwire Ranch |         | Pafford Crossing |         | Big Satan Creek Station |         |
|--------|--------------|---------|--------------|---------|----------------|---------|------------------|---------|-------------------------|---------|
|        | 1981         | Average | 1981         | Average | 1981           | Average | 1981             | Average | 1981                    | Average |
| Jan.   | 0.40         | 0.30    | 0.62         | 0.50    | 0.60           | 0.52    | 0.80             | 0.49    | 0.75                    | 0.50    |
| Feb.   | .31          | .48     | .22          | .85     | .50            | .65     | .45              | .73     | .40                     | .57     |
| Mar.   | 1.09         | .41     | 2.11         | .84     | 3.20           | .91     | 2.30             | .61     | 1.85                    | 1.06    |
| Apr.   | 3.67         | 1.44    | 3.28         | 1.77    | 4.15           | 1.98    | 3.37             | 1.48    | 3.64                    | 1.98    |
| May    | 2.68         | 1.82    | 1.11         | 1.90    | 1.55           | 2.41    | 1.03             | 1.85    | 1.06                    | 2.18    |
| June   | 3.14         | 2.37    | 6.93         | 2.00    | 5.40           | 2.18    | 4.45             | 2.17    | 6.62                    | 2.00    |
| July   | .30          | 1.46    | .94          | 1.72    | 1.00           | 2.68    | 3.20             | 1.92    | .98                     | 2.33    |
| Aug.   | .20          | 1.92    | 1.33         | 1.75    | 2.00           | 3.53    | 1.30             | 2.08    | 1.90                    | 3.16    |
| Sept.  | .20          | 2.70    | .18          | 2.86    | T              | 2.44    | .40              | 3.01    | 0                       | 2.32    |
| Oct.   | 5.30         | 2.19    | 1.18         | 2.20    | 3.45           | 2.31    | 3.00             | 2.15    | 3.25                    | 2.44    |
| Nov.   | 0            | .56     | 0            | .77     | 0              | .82     | 0                | .70     | 0                       | .82     |
| Dec.   | 0            | .31     | 0            | .57     | 0              | .45     | 0                | .47     | 0                       | .56     |
| Yearly | 17.29        | 15.96   | 17.90        | 17.73   | 21.85          | 20.88   | 20.30            | 17.66   | 20.45                   | 19.92   |

| Month  | Cliff Lowry Ranch No. 1 |         | Lowry Ranch No. 2 |         | Tuffy Whitehead Ranch |         | Stewart Ranch |         | Rough Canyon near Del Rio |         |
|--------|-------------------------|---------|-------------------|---------|-----------------------|---------|---------------|---------|---------------------------|---------|
|        | 1981                    | Average | 1981              | Average | 1981                  | Average | 1981          | Average | 1981                      | Average |
| Jan.   | 0.77                    | 0.42    | 0.60              | 0.36    | 0.71                  | 0.33    | 0.55          | 0.42    | 0.45                      | 0.34    |
| Feb.   | .32                     | .97     | .66               | .83     | .30                   | .71     | .25           | .83     | .14                       | .80     |
| Mar.   | 2.03                    | .83     | 1.46              | .82     | 1.64                  | .65     | 1.95          | .67     | 1.46                      | .76     |
| Apr.   | 3.61                    | 1.94    | 4.33              | 1.94    | 3.63                  | 1.54    | 3.67          | 1.83    | 4.80                      | 1.76    |
| May    | .64                     | 2.48    | .87               | 1.92    | 2.11                  | 1.57    | 1.07          | 1.72    | 1.15                      | 1.56    |
| June   | 4.13                    | 2.26    | 4.52              | 2.08    | 4.99                  | 1.94    | 4.20          | 2.35    | 3.80                      | 2.27    |
| July   | .39                     | 1.90    | 1.77              | 2.06    | .45                   | 1.44    | .19           | 1.80    | 1.60                      | 2.31    |
| Aug.   | 2.65                    | 2.52    | 1.59              | 2.61    | 1.96                  | 1.84    | 2.20          | 1.98    | .80                       | 2.75    |
| Sept.  | 1.26                    | 3.02    | .26               | 2.27    | .24                   | 2.70    | .33           | 2.46    | .30                       | 2.21    |
| Oct.   | 5.44                    | 2.36    | 4.36              | 2.09    | 1.88                  | 1.78    | 3.49          | 2.15    | 3.95                      | 2.54    |
| Nov.   | 0                       | .86     | 0                 | .81     | 0                     | .63     | 0             | .75     | 0                         | .86     |
| Dec.   | 0                       | .50     | 0                 | .52     | 0                     | .40     | 0             | .51     | 0                         | .49     |
| Yearly | 21.24                   | 20.06   | 20.42             | 18.31   | 17.91                 | 15.53   | 17.90         | 17.47   | 18.45                     | 18.65   |

| Month  | Devils Lake |         | Sellers Ranch |         | Evans Creek near Comstock |         | J. G. Brite Ranch |         | Hutto Ranch No. 1 |         |
|--------|-------------|---------|---------------|---------|---------------------------|---------|-------------------|---------|-------------------|---------|
|        | 1981        | Average | 1981          | Average | 1981                      | Average | 1981              | Average | 1981              | Average |
| Jan.   | 0.62        | 0.61    | 0.45          | 0.36    | 0.50                      | 0.25    | 0.59              | 0.34    | 0.75              | 0.48    |
| Feb.   | .39         | .82     | .28           | .68     | .31                       | .67     | .18               | .83     | .20               | .85     |
| Mar.   | 1.47        | .64     | 1.12          | .55     | 1.12                      | .69     | 1.58              | .75     | 2.90              | .78     |
| Apr.   | 5.20        | 1.72    | 4.11          | 1.47    | 4.56                      | 1.51    | 4.04              | 1.70    | 4.54              | 2.23    |
| May    | 1.49        | 1.77    | 1.48          | 1.49    | 2.05                      | 1.21    | 1.73              | 1.90    | 1.14              | 1.87    |
| June   | 4.50        | 2.33    | 5.95          | 2.47    | 4.34                      | 2.24    | 6.42              | 2.28    | 7.13              | 2.25    |
| July   | 2.00        | 1.35    | .25           | 1.32    | .29                       | 2.01    | 1.00              | 1.63    | .51               | 2.17    |
| Aug.   | 1.20        | 1.84    | .70           | 1.92    | .65                       | 2.96    | .90               | 2.23    | 1.13              | 2.26    |
| Sept.  | .20         | 2.32    | .20           | 2.39    | .25                       | 2.76    | .31               | 3.07    | .25               | 2.56    |
| Oct.   | 3.48        | 1.95    | 1.90          | 1.93    | 1.30                      | 1.96    | 2.57              | 2.11    | 4.14              | 2.24    |
| Nov.   | 0           | .69     | 0             | .67     | 0                         | .88     | 0                 | .80     | 0                 | .82     |
| Dec.   | 0           | .68     | 0             | .44     | 0                         | .36     | 0                 | .47     | 0                 | .52     |
| Yearly | 20.55       | 16.72   | 16.44         | 15.69   | 15.37                     | 17.50   | 19.32             | 18.11   | 22.69             | 19.03   |

| Month  | Hutto Ranch No. 2 |         | Middle Fork San Pedro |         | North Fork San Pedro |         | Long Ranch |         | Buoy No. 11 |         |
|--------|-------------------|---------|-----------------------|---------|----------------------|---------|------------|---------|-------------|---------|
|        | 1981              | Average | 1981                  | Average | 1981                 | Average | 1981       | Average | 1981        | Average |
| Jan.   | 0.77              | 0.49    | 0.50                  | 0.41    | 0.55                 | 0.39    | 0.68       | 0.43    | 0.65        | 0.34    |
| Feb.   | .26               | .94     | .18                   | .79     | .16                  | .68     | .09        | .68     | .34         | .44     |
| Mar.   | 2.87              | .76     | 3.02                  | .91     | 2.74                 | .89     | 1.96       | .87     | .31         | .54     |
| Apr.   | 5.17              | 2.32    | 4.40                  | 2.19    | 4.36                 | 2.12    | 5.07       | 2.03    | 9.95        | 2.16    |
| May    | 1.25              | 1.68    | 1.30                  | 2.18    | 1.51                 | 1.97    | 1.16       | 1.88    | 1.75        | 1.64    |
| June   | 6.78              | 2.37    | 7.50                  | 2.34    | 6.00                 | 2.35    | 5.63       | 2.38    | 5.07        | 2.19    |
| July   | .90               | 2.13    | .35                   | 2.83    | .65                  | 2.84    | .47        | 2.44    | .28         | 1.91    |
| Aug.   | 2.28              | 2.32    | 1.05                  | 2.60    | 2.05                 | 2.60    | 2.09       | 1.82    | .46         | 2.36    |
| Sept.  | .49               | 3.21    | .21                   | 1.46    | .27                  | 1.80    | .15        | 1.84    | .33         | 2.28    |
| Oct.   | 4.86              | 2.09    | 4.86                  | 2.87    | 4.43                 | 2.64    | 5.09       | 2.32    | 1.43        | 1.63    |
| Nov.   | 0                 | .93     | 0                     | 1.00    | 0                    | .97     | 0          | .78     | 0           | .56     |
| Dec.   | 0                 | .47     | 0                     | .58     | 0                    | .55     | 0          | .48     | 0           | .34     |
| Yearly | 25.63             | 19.71   | 23.37                 | 20.16   | 22.72                | 19.80   | 22.39      | 17.95   | 20.57       | 16.39   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

| Month  | Amistad Dam |         | Laughlin Air Force Base |         | Gillis Headquarters Ranch |         | Lewis Ranch |         | Maverick County Canal Headgate |         |
|--------|-------------|---------|-------------------------|---------|---------------------------|---------|-------------|---------|--------------------------------|---------|
|        | 1981        | Average | 1981                    | Average | 1981                      | Average | 1981        | Average | 1981                           | Average |
| Jan.   | 0.66        | 0.45    | 0.65                    | 0.48    | 0.64                      | 0.57    | 0.80        | 0.56    | 0.25                           | 0.54    |
| Feb.   | .24         | .79     | .30                     | .87     | .45                       | .95     | .35         | 1.04    | .91                            | .91     |
| Mar.   | 2.30        | .80     | 1.38                    | .54     | 2.79                      | .95     | 3.42        | .91     | 1.45                           | .61     |
| Apr.   | 6.27        | 2.05    | 4.52                    | 2.12    | 4.18                      | 2.37    | 5.95        | 2.46    | 6.38                           | 1.70    |
| May    | 1.86        | 1.98    | 1.32                    | 2.02    | 2.87                      | 2.31    | 1.07        | 2.37    | 1.94                           | 2.11    |
| June   | 5.48        | 2.17    | 6.61                    | 2.80    | 4.72                      | 2.56    | 5.55        | 2.43    | 3.98                           | 2.26    |
| July   | .39         | 1.90    | .28                     | 2.52    | 1.31                      | 2.64    | 1.65        | .70     | 1.00                           | 1.75    |
| Aug.   | 1.89        | 2.40    | 1.40                    | 1.92    | 1.89                      | 3.13    | .40         | 2.44    | 1.00                           | 1.61    |
| Sept.  | .05         | 3.53    | .44                     | 2.37    | 1.10                      | 1.93    | .50         | 2.94    | 2.97                           | 2.69    |
| Oct.   | 3.14        | 1.97    | 4.19                    | 2.62    | 5.33                      | 2.80    | 5.10        | 2.75    | 3.03                           | 2.10    |
| Nov.   | 0           | .78     | 0                       | 1.00    | 0                         | 1.13    | 0           | 1.07    | 0                              | .93     |
| Dec.   | .07         | .52     | .14                     | .54     | 0                         | .74     | 0           | .66     | 0                              | .54     |
| Yearly | 22.35       | 19.34   | 21.23                   | 19.80   | 25.28                     | 22.08   | 24.79       | 21.31   |                                | 17.75   |

| Month  | Wardlaw Standart Ranch |         | Pinto Creek Station |         | Las Moras Creek |         | Wipff Ranch |         | Lateral No. 2 Spill |         |
|--------|------------------------|---------|---------------------|---------|-----------------|---------|-------------|---------|---------------------|---------|
|        | 1981                   | Average | 1981                | Average | 1981            | Average | 1981        | Average | 1981                | Average |
| Jan.   | 1.16                   | 0.44    | 0.90                | 0.54    | 1.16            | 0.70    | 0.90        | 0.64    | 1.20                | 0.60    |
| Feb.   | .07                    | .58     | 0                   | .69     | .28             | .96     | 0           | .72     | 0                   | .64     |
| Mar.   | 2.14                   | 1.86    | .90                 | .54     | 1.22            | .65     | .80         | .62     | 1.00                | .68     |
| Apr.   | 6.80                   | 2.41    | 7.50                | 1.63    | 4.25            | 1.49    | 8.20        | 1.88    | 8.30                | 2.01    |
| May    | 1.25                   | 2.00    | .50                 | 1.99    | 1.19            | 2.26    | .20         | 2.41    | 1.50                | 2.75    |
| June   | 6.64                   | 3.10    | 3.90                | 2.42    | 4.00            | 2.60    | 3.60        | 2.30    | 4.20                | 2.37    |
| July   | .63                    | .74     | .35                 | 1.46    | .83             | 1.35    | .40         | 1.57    | 0                   | 1.84    |
| Aug.   | .15                    | .77     | .70                 | 1.71    | .59             | 1.98    | 0           | 1.85    | .70                 | 2.09    |
| Sept.  | 2.30                   | 1.42    | 2.25                | 2.81    | 2.56            | 3.31    | 0           | 2.74    | 1.60                | 2.96    |
| Oct.   | 2.05                   | 1.35    | 2.70                | 2.00    | 1.07            | 2.39    | .50         | 2.08    | 1.00                | 2.07    |
| Nov.   | 0                      | 2.66    | 0                   | 1.22    | 0               | 1.04    | 0           | 1.18    | 0                   | 1.06    |
| Dec.   | .20                    | .31     | 0                   | .54     | .37             | .63     | .10         | .54     | 0                   | .48     |
| Yearly | 23.39                  | 17.64   | 19.70               | 17.55   | 17.52           | 19.36   | 14.70       | 18.53   | 19.50               | 19.55   |

| Month  | Normandy |         | Lateral No. 12 Headgate |         | Lateral 15 Spill |         | Maverick Power Plant |         | Cooper Ranch |         |
|--------|----------|---------|-------------------------|---------|------------------|---------|----------------------|---------|--------------|---------|
|        | 1981     | Average | 1981                    | Average | 1981             | Average | 1981                 | Average | 1981         | Average |
| Jan.   | 1.10     | 0.72    | 0.75                    | 0.55    | 1.15             | 0.58    | 1.09                 | 0.67    | 1.25         | 0.50    |
| Feb.   | .31      | .69     | .10                     | .55     | 0                | .58     | .51                  | .73     | 0            | .63     |
| Mar.   | 1.15     | .76     | .75                     | .60     | 1.15             | .55     | 1.10                 | .78     | 1.00         | .68     |
| Apr.   | 7.39     | 2.13    | 8.00                    | 1.95    | 10.70            | 1.85    | 8.33                 | 2.04    | 9.30         | 1.91    |
| May    | 2.96     | 1.70    | 2.81                    | 2.18    | 2.18             | 2.60    | 2.39                 | 2.79    | 1.40         | 2.52    |
| June   | 5.52     | 2.28    | 4.70                    | 2.18    | 4.15             | 2.09    | 6.01                 | 2.47    | 9.50         | 2.79    |
| July   | .80      | 2.02    | 1.20                    | 1.60    | 0                | 1.89    | .84                  | 1.65    | .70          | 1.91    |
| Aug.   | .20      | 2.17    | .75                     | 1.86    | 0                | 1.76    | .22                  | 1.97    | 0            | 2.01    |
| Sept.  | 2.46     | 2.98    | 1.60                    | 2.77    | 1.50             | 2.40    | 3.05                 | 2.75    | 1.10         | 3.29    |
| Oct.   | 1.19     | 2.34    | .90                     | 2.43    | .70              | 2.39    | 1.25                 | 2.40    | 1.85         | 2.33    |
| Nov.   | 0        | 1.03    | 0                       | .86     | 0                | .80     | 0                    | .82     | 0            | .92     |
| Dec.   | .22      | .64     | 0                       | .50     | 0                | .50     | .08                  | .56     | 0            | .53     |
| Yearly | 20.72    | 20.45   | 18.66                   | 21.53   | 17.99            | 24.87   | 19.63                | 26.10   | 20.02        |         |

| Month  | Coal Mine |         | Elm Creek Station |         | Chittim Ranch |         | Eagle Pass |         | Canon Diablo |         |
|--------|-----------|---------|-------------------|---------|---------------|---------|------------|---------|--------------|---------|
|        | 1981      | Average | 1981              | Average | 1981          | Average | 1981       | Average | 1981         | Average |
| Jan.   | 1.10      | 0.56    | 1.50              | 0.52    | 1.25          | 0.54    | 1.46       | 0.65    | 1.70         | 0.55    |
| Feb.   | .21       | .67     | .15               | .59     | T             | .70     | .34        | .78     | 0            | .62     |
| Mar.   | 1.00      | .73     | .80               | .56     | .60           | .58     | 1.21       | .80     | 1.00         | .64     |
| Apr.   | 5.35      | 1.85    | 7.00              | 1.95    | 8.30          | 2.20    | 6.22       | 2.00    | 3.50         | 2.04    |
| May    | 2.75      | 2.87    | 2.80              | 3.16    | 3.20          | 3.25    | 5.58       | 3.89    | 4.80         | 3.98    |
| June   | 6.65      | 2.06    | 4.20              | 2.41    | 3.50          | 2.27    | 5.86       | 3.03    | 5.40         | 2.86    |
| July   | .30       | 2.10    | 0                 | 1.86    | .35           | 1.94    | .54        | 1.93    | .05          | 1.46    |
| Aug.   | .70       | 1.83    | 0                 | 2.12    | 2.00          | 2.32    | 3.05       | 3.07    | 2.30         | 2.57    |
| Sept.  | .45       | 3.10    | .30               | 2.71    | .10           | 2.81    | 1.19       | 3.19    | .80          | 3.31    |
| Oct.   | 1.63      | 2.40    | .70               | 2.35    | 1.30          | 2.48    | 1.53       | 2.28    | .90          | 2.05    |
| Nov.   | 0         | .81     | 0                 | .74     | 0             | .75     | .05        | .92     | 0            | .89     |
| Dec.   | .15       | .42     | 0                 | .51     | 0             | .52     | .19        | .67     | 0            | .52     |
| Yearly | 20.29     | 19.40   | 17.45             | 19.48   | 20.60         | 20.36   | 27.22      | 23.21   | 20.45        | 21.49   |

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## RAINFALL ON THE RIO GRANDE WATERSHED

IN THE UNITED STATES

In Inches

| Month  | Rosita Creek Siphon |         | Weyrich Farm |         | Trees Farm |         | Rosita Creek Station |         | Farias Ranch |         |
|--------|---------------------|---------|--------------|---------|------------|---------|----------------------|---------|--------------|---------|
|        | 1981                | Average | 1981         | Average | 1981       | Average | 1981                 | Average | 1981         | Average |
| Jan.   | 1.50                | 0.49    | 1.00         | 0.49    | 1.31       | 0.51    | 1.90                 | 0.47    | 1.65         | 0.64    |
| Feb.   | .20                 | .68     | 0            | .65     | 0          | .69     | 0                    | .62     | .35          | .91     |
| Mar.   | 1.00                | .58     | 0            | .44     | .80        | .45     | .60                  | .48     | 1.25         | .53     |
| Apr.   | 8.50                | 1.99    | 10.70        | 2.13    | 8.59       | 2.12    | 5.70                 | 2.10    | 7.25         | 2.17    |
| May    | 2.40                | 2.86    | 3.60         | 3.19    | 3.07       | 3.03    | 6.10                 | 2.87    | 3.75         | 3.27    |
| June   | 4.20                | 2.24    | 2.20         | 1.84    | 4.90       | 2.03    | 5.40                 | 2.29    | 8.00         | 2.28    |
| July   | .50                 | 1.80    | 0            | 1.18    | .25        | 1.72    | .20                  | 1.38    | .60          | 2.16    |
| Aug.   | 1.10                | 1.97    | .90          | 1.92    | 3.80       | 1.95    | .60                  | 1.83    | 1.35         | 2.16    |
| Sept.  | .20                 | 2.73    | 0            | 2.65    | .66        | 2.70    | .30                  | 2.80    | 1.60         | 3.70    |
| Oct.   | 1.20                | 2.15    | 1.50         | 1.70    | 1.77       | 2.85    | 1.10                 | 2.55    | 1.55         | 2.79    |
| Nov.   | 0                   | .85     | 0            | .77     | 0          | .85     | 0                    | .84     | 0            | .87     |
| Dec.   | 0                   | .59     | 0            | .53     | .20        | .55     | 0                    | .53     | .35          | .71     |
| Yearly | 20.80               | 18.93   | 19.90        | 17.49   | 25.35      | 19.45   | 21.90                | 18.76   | 27.70        | 22.19   |

| Month  | Indio Ranch |         | El Indio |         | Van Dalsen Farm |         | Wuensche Farm |         | Keisling Farm |         |
|--------|-------------|---------|----------|---------|-----------------|---------|---------------|---------|---------------|---------|
|        | 1981        | Average | 1981     | Average | 1981            | Average | 1981          | Average | 1981          | Average |
| Jan.   | 1.85        | 0.63    | 1.77     | 0.72    | 2.40            | 0.56    | 2.27          | 0.67    | 2.15          | 0.59    |
| Feb.   | .10         | .76     | .51      | .87     | .20             | .78     | .12           | .87     | .16           | .80     |
| Mar.   | 1.37        | .56     | 1.12     | .55     | .80             | .49     | 1.29          | .59     | 1.42          | .66     |
| Apr.   | 6.55        | 2.21    | 6.94     | 1.91    | 10.30           | 2.26    | 10.12         | 1.96    | 10.19         | 2.10    |
| May    | 4.91        | 3.01    | 3.65     | 3.41    | 4.70            | 3.29    | 5.60          | 3.06    | 3.00          | 2.91    |
| June   | 5.20        | 2.48    | 7.29     | 2.18    | 7.90            | 1.87    | 7.05          | 2.39    | 6.95          | 2.71    |
| July   | 1.02        | 1.94    | .70      | 1.29    | .20             | 1.54    | .31           | 1.31    | .18           | 1.46    |
| Aug.   | 1.21        | 1.79    | .79      | 2.00    | .40             | 1.62    | .33           | 1.75    | .18           | 1.79    |
| Sept.  | 2.12        | 3.46    | 1.33     | 3.08    | 1.90            | 3.31    | 2.20          | 3.09    | 2.28          | 2.98    |
| Oct.   | 2.22        | 2.54    | 2.67     | 2.27    | 1.40            | 2.40    | 1.97          | 2.18    | 2.01          | 2.34    |
| Nov.   | 0           | .86     | 0        | .77     | 0               | .76     | 0             | .75     | 0             | .70     |
| Dec.   | .38         | .63     | .30      | .63     | .30             | .60     | .21           | .58     | .34           | .74     |
| Yearly | 26.93       | 20.87   | 27.07    | 19.68   | 30.50           | 19.51   | 31.47         | 19.20   | 28.86         | 19.78   |

| Month  | Cuervo Creek Station |         | Apache Ranch |         | Laredo Water Plant |         | Fort McIntosh (Laredo) |         | Corralitos Ranch |         |
|--------|----------------------|---------|--------------|---------|--------------------|---------|------------------------|---------|------------------|---------|
|        | 1981                 | Average | 1981         | Average | 1981               | Average | 1981                   | Average | 1981             | Average |
| Jan.   | 1.95                 | 0.61    | 0            | 0.57    | 1.50               | 0.75    | 1.81                   | 0.74    | 1.60             | 0.61    |
| Feb.   | T                    | .66     | 0            | .84     | .56                | .77     | .49                    | .86     | .80              | .74     |
| Mar.   | 1.60                 | .45     | 0            | .38     | 2.15               | .60     | 2.49                   | .71     | 2.20             | .51     |
| Apr.   | 10.40                | 1.88    | .80          | 1.46    | 4.31               | 1.22    | 3.93                   | 1.36    | 2.10             | 1.16    |
| May    | 3.00                 | 2.48    | 0            | 2.47    | 6.62               | 2.47    | 7.91                   | 2.75    | 6.60             | 2.08    |
| June   | 7.10                 | 2.37    | 5.00         | 1.92    | 3.55               | 2.25    | 5.53                   | 2.31    | 3.50             | 2.33    |
| July   | 0                    | 1.28    | .10          | 2.14    | T                  | 1.19    | 4.16                   | 1.47    | 6.35             | 1.34    |
| Aug.   | 0                    | 1.64    | 0            | 1.97    | 4.84               | 1.98    | 2.80                   | 1.99    | .30              | 1.92    |
| Sept.  | .90                  | 3.04    | 1.50         | 3.48    | 1.37               | 3.07    | 1.19                   | 2.95    | 1.00             | 3.40    |
| Oct.   | 1.80                 | 2.20    | 1.00         | 2.27    | 3.82               | 1.78    | 5.43                   | 1.81    | 2.60             | 1.73    |
| Nov.   | 0                    | .74     | 0            | .66     | 0                  | .89     | 0                      | 1.14    | 0                | .87     |
| Dec.   | .10                  | .53     | 0            | .69     | .07                | .83     | .21                    | .86     | .30              | .58     |
| Yearly | 26.85                | 17.88   | 8.40         | 18.85   | 28.79              | 17.80   | 35.95                  | 18.95   | 27.35            | 17.27   |

| Month  | Huisache Ranch |         | Zapata Water Plant |         | Arroyo Tigre Chiquito |         | Falcon Dam |         | Roma (International Bridge) |         |
|--------|----------------|---------|--------------------|---------|-----------------------|---------|------------|---------|-----------------------------|---------|
|        | 1981           | Average | 1981               | Average | 1981                  | Average | 1981       | Average | 1981                        | Average |
| Jan.   | 1.30           | 0.72    | 1.08               | 0.74    | 2.00                  | 0.72    | 2.88       | 0.84    | 3.80                        | 0.89    |
| Feb.   | 1.20           | .91     | .90                | .81     | .35                   | .83     | .86        | .84     | .99                         | .64     |
| Mar.   | 1.70           | .56     | 1.57               | .51     | 1.00                  | .32     | 1.93       | .64     | 2.88                        | 1.40    |
| Apr.   | 3.50           | 1.36    | 3.88               | 1.55    | 4.30                  | 1.13    | 4.21       | 1.19    | 2.35                        | 1.75    |
| May    | 7.00           | 2.28    | 7.29               | 2.74    | 2.05                  | 2.17    | 5.85       | 2.70    | 7.31                        | 2.16    |
| June   | 7.00           | 2.62    | 5.92               | 2.39    | .70                   | .70     | 3.79       | 1.21    | 3.00                        | 1.33    |
| July   | 7.42           | 1.45    | 8.87               | 1.54    | 4.61                  | 1.27    | 1.26       | 1.21    | 2.52                        | 1.95    |
| Aug.   | 3.00           | 1.65    | 6.88               | 2.05    | 3.32                  | 4.49    | 1.76       | 4.54    | 4.57                        | 4.57    |
| Sept.  | 1.28           | 4.28    | .13                | 4.68    | 0                     | 4.49    | 1.76       | 2.12    | 4.50                        | 2.02    |
| Oct.   | 1.70           | 1.97    | 2.64               | 1.77    | 2.35                  | 1.86    | 2.80       | 1.12    | 0                           | .75     |
| Nov.   | 0              | .85     | 0                  | .92     | 0                     | 1.05    | 0          | 1.12    | 0                           | .42     |
| Dec.   | .30            | .73     | 0                  | .71     | 0                     | .54     | .21        | .68     | 0                           | .42     |
| Yearly | 35.40          | 19.38   | 39.16              | 20.41   | 20.68                 | 18.54   | 30.33      | 20.75   |                             | 18.87   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN THE UNITED STATES**  
**In Inches**

| Month         | Garciasville |              | Los Ebanos   |              | La Joya      |              | HCWCID #6<br>Goodwin Pump No. 4B |         | HCWCID #6<br>Goodwin Pump No. 3 |         |              |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------------------------|---------|---------------------------------|---------|--------------|
|               | 1981         | Average      | 1981         | Average      | 1981         | Average      | 1981                             | Average | 1981                            | Average |              |
| Jan.          | 2.49         | 0.92         | 2.64         | 1.08         | 2.68         | 1.03         |                                  |         | 1.22                            | 2.27    | 1.28         |
| Feb.          | .62          | .83          | .85          | .81          | .85          | .90          |                                  |         | .99                             | 7.90    | 1.22         |
| Mar.          | 2.80         | .50          | 1.37         | .43          | 2.40         | .48          | 2.40                             |         | .51                             | 3.63    | .69          |
| Apr.          | 2.51         | 1.12         | 2.83         | 1.57         | 1.00         | 1.05         |                                  |         | 1.21                            | 2.37    | 1.51         |
| May           | 6.06         | 2.22         | 1.68         | 1.87         | 3.05         | 2.30         | 2.54                             |         | 2.10                            | 5.07    | 2.44         |
| June          | 6.82         | 2.49         | 7.13         | 2.33         | 12.09        | 2.77         | 4.88                             |         | 2.50                            | 5.68    | 2.55         |
| July          | 1.26         | 1.30         | 1.54         | 1.25         | 2.43         | 1.23         | 3.30                             |         | 1.24                            | 6.68    | 1.68         |
| Aug.          | 4.57         | 2.05         | 1.81         | 2.14         | 2.86         | 1.69         |                                  |         | 1.68                            | 2.66    | 2.07         |
| Sept.         | 1.30         | 3.71         | .37          | 3.36         | 1.15         | 3.27         | .30                              |         | 3.20                            | .49     | 3.30         |
| Oct.          | 2.52         | 1.98         | 3.34         | 2.11         | 2.55         | 1.92         |                                  |         | .95                             | 3.80    | .94          |
| Nov.          | 0            | .93          | .03          | .58          | 0            | .85          |                                  |         | .86                             |         | .98          |
| Dec.          | .26          | .71          | .13          | .73          | 0            | .89          |                                  |         |                                 |         |              |
| <b>Yearly</b> | <b>31.21</b> | <b>18.76</b> | <b>23.72</b> | <b>18.26</b> | <b>31.06</b> | <b>18.38</b> |                                  |         | <b>19.11</b>                    |         | <b>21.62</b> |

| Month         | HCWCID #6<br>Goodwin Pump No. 5 |              | HCWCID #6<br>Goodwin Pump No. 3A |              | HCWCID #6<br>Goodwin Pump No. 4 |              | Penitas (Edinburg<br>Pumping Plant) |              | New Mission<br>Pumping Plant |              |
|---------------|---------------------------------|--------------|----------------------------------|--------------|---------------------------------|--------------|-------------------------------------|--------------|------------------------------|--------------|
|               | 1981                            | Average      | 1981                             | Average      | 1981                            | Average      | 1981                                | Average      | 1981                         | Average      |
| Jan.          |                                 | 1.22         |                                  |              | 2.50                            | 1.60         | 3.40                                | 1.35         | 4.36                         | 1.11         |
| Feb.          | .95                             |              | .93                              |              | .95                             | .60          | .89                                 | 1.45         | .81                          |              |
| Mar.          | .57                             |              | .80                              |              | .63                             | 2.10         | .52                                 | 3.20         | .76                          |              |
| Apr.          | 1.30                            |              | 1.82                             |              | 1.53                            | 1.25         | 1.19                                | 2.02         | 1.45                         |              |
| May           | 3.56                            |              | 6.31                             |              | 2.37                            | 8.25         | 2.45                                | 8.75         | 2.71                         |              |
| June          | 3.05                            |              | 5.10                             |              | 4.27                            | 2.73         | 8.15                                | 3.17         | 7.66                         | 2.76         |
| July          | 1.75                            |              | 1.23                             |              | 1.49                            | 1.69         | 3.45                                | 1.53         | 3.30                         | 1.56         |
| Aug.          | 4.13                            |              | 2.70                             |              | 2.48                            | 1.87         | 2.18                                | 5.40         | 2.60                         | 2.46         |
| Sept.         | .95                             |              | 4.60                             |              | .60                             | 3.58         | .90                                 | 3.54         | 1.25                         | 3.07         |
| Oct.          | 6.20                            |              |                                  |              | 3.05                            |              | 3.05                                |              | 2.80                         | 5.40         |
| Nov.          |                                 |              |                                  |              | .98                             |              | 1.00                                |              | .94                          | .67          |
| Dec.          |                                 |              |                                  |              | .88                             |              | 1.07                                |              | .40                          | .79          |
| <b>Yearly</b> |                                 | <b>21.79</b> |                                  | <b>22.03</b> |                                 | <b>22.38</b> | <b>36.13</b>                        | <b>21.92</b> | <b>44.86</b>                 | <b>20.78</b> |

| Month         | HCWCID #15<br>(Edinburg Office) |              | Edinburg<br>Filtration Plant |              | La Feria<br>Pumping Plant |              | La Feria<br>Materials Yard |              | CCWCID #19<br>(Adams Gardens) |              |
|---------------|---------------------------------|--------------|------------------------------|--------------|---------------------------|--------------|----------------------------|--------------|-------------------------------|--------------|
|               | 1981                            | Average      | 1981                         | Average      | 1981                      | Average      | 1981                       | Average      | 1981                          | Average      |
| Jan.          | 2.26                            | 1.37         | 2.79                         | 1.54         | 2.10                      | 1.59         | 5.90                       | 1.59         | 3.34                          | 1.33         |
| Feb.          | .67                             | .99          | .82                          | 1.09         | 1.60                      | 1.53         | 1.40                       | 1.36         | .73                           | 1.23         |
| Mar.          | 2.17                            | .62          | 2.07                         | .71          | 3.90                      | .84          | 4.80                       | .88          | 3.12                          | .78          |
| Apr.          | 1.02                            | 1.76         | 3.59                         | 1.78         | 1.90                      | 2.13         | 3.90                       | 1.71         | 2.09                          | 1.58         |
| May           | 4.85                            | 2.40         | 4.28                         | 2.23         | 9.30                      | 3.06         | 4.50                       | 2.76         | 6.77                          | 2.56         |
| June          | 3.27                            | 2.48         | 3.80                         | 2.74         | 8.30                      | 3.56         | 8.50                       | 3.94         | 2.78                          | 2.75         |
| July          | .28                             | 1.39         | 2.43                         | 1.33         | 2.10                      | 2.31         | 2.00                       | 1.92         | 1.67                          | 1.56         |
| Aug.          | 3.72                            | 2.72         | 5.10                         | 2.63         | 6.00                      | 4.03         | 4.70                       | 3.77         | 6.70                          | 3.36         |
| Sept.         | .18                             | 4.46         | .41                          | 3.79         | .50                       | 6.53         | .70                        | 5.08         | 1.47                          | 4.15         |
| Oct.          | 4.07                            | 2.72         | 3.22                         | 2.67         | 3.50                      | 4.04         | 6.60                       | 3.55         | 3.18                          | 3.01         |
| Nov.          | 0                               | 1.01         | 0                            | 1.08         | 0                         | 1.89         | 0                          | .25          | .03                           | 1.49         |
| Dec.          | .20                             | .95          | .22                          | 1.01         | 0                         | 1.47         | 0                          | 1.63         | .23                           | 1.12         |
| <b>Yearly</b> | <b>22.69</b>                    | <b>22.87</b> | <b>28.73</b>                 | <b>22.60</b> | <b>39.20</b>              | <b>32.98</b> | <b>43.25</b>               | <b>29.72</b> | <b>32.11</b>                  | <b>24.92</b> |

| Month         | San Benito<br>Pump |              | Whipple<br>Farm |              | CCWCID #11<br>(Bayview Dist. Off.) |              |  |  |  |  |
|---------------|--------------------|--------------|-----------------|--------------|------------------------------------|--------------|--|--|--|--|
|               | 1981               | Average      | 1981            | Average      | 1981                               | Average      |  |  |  |  |
| Jan.          | 3.29               | 1.40         | 3.45            | 1.94         | 2.53                               | 1.47         |  |  |  |  |
| Feb.          | .85                | .98          | .78             | 1.78         | 0                                  | 1.63         |  |  |  |  |
| Mar.          | 4.24               | .84          | 4.11            | .74          | 2.66                               | .71          |  |  |  |  |
| Apr.          | 1.12               | 1.40         | .60             | 2.13         | 1.20                               | 1.98         |  |  |  |  |
| May           | 8.40               | 2.60         | 8.17            | 3.02         | 4.05                               | 2.54         |  |  |  |  |
| June          | 3.34               | 2.56         | 1.40            | 3.39         | 3.50                               | 2.44         |  |  |  |  |
| July          | 1.56               | 1.70         | 3.90            | 2.43         | 4.50                               | 1.90         |  |  |  |  |
| Aug.          | 5.32               | 2.49         | 2.90            | 3.32         | 3.15                               | 2.85         |  |  |  |  |
| Sept.         | 3.64               | 4.47         | 5.55            | 6.07         | 3.60                               | 5.54         |  |  |  |  |
| Oct.          | 6.51               | 2.76         | 4.55            | 3.27         | 1.40                               | 2.33         |  |  |  |  |
| Nov.          | 0                  | 1.12         | 1.05            | 1.62         | 0                                  | 1.44         |  |  |  |  |
| Dec.          | .20                | 1.29         | 1.79            | 1.67         | 0                                  | 1.38         |  |  |  |  |
| <b>Yearly</b> | <b>38.47</b>       | <b>23.61</b> | <b>38.25</b>    | <b>31.38</b> | <b>26.59</b>                       | <b>26.21</b> |  |  |  |  |

\* Average of 18 gages

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO**  
**In Inches**

Tabulated below, in approximate downstream order, are monthly records of Mexican rainfall stations with averages for their periods of record. For location, elevation, period of record, type of gage in use, watershed subdivision in which the station is located, and the observer, see alphabetical listing of these stations shown on pages 141 through 144 in this bulletin. These rainfall records have not been published elsewhere. Records of daily rainfall amounts, where available, are on file in the office of the Mexican Section of the Commission.

Detailed listings of the months and years for which records are available through 1970 may be found under "Index to Precipitation Records" in Water Bulletins 10, 14, 22, 26, and Supplement 40A.

| Month  | Juarez,<br>Chihuahua |         | Juarez, (SARH)<br>Chihuahua |         | El Sauzal D. B.,<br>Chihuahua |         | Garita Km. 28,<br>Chihuahua |         | Samalayuca,<br>Chihuahua |         |
|--------|----------------------|---------|-----------------------------|---------|-------------------------------|---------|-----------------------------|---------|--------------------------|---------|
|        | 1981                 | Average | 1981                        | Average | 1981                          | Average | 1981                        | Average | 1981                     | Average |
| Jan.   | 0.83                 | 0.42    | 1.38                        |         | 1.10                          | 0.54    | 0.91                        | 0.59    | 1.97                     | 0.49    |
| Feb.   | .43                  | .45     | .20                         |         | .24                           | .39     | .47                         | .47     | .24                      | .51     |
| Mar.   | .47                  | .35     | .59                         |         | .35                           | .14     | .43                         | .29     | .35                      | .36     |
| Apr.   | 1.10                 | .30     | 1.42                        |         | .43                           | .14     | .20                         | .14     | .79                      | .17     |
| May    | 1.22                 | .35     | 1.02                        |         | .47                           | .35     | 1.93                        | .32     | 1.54                     | .25     |
| June   | T                    | .61     | .24                         |         | .47                           | .38     | .75                         | .71     | .63                      | .74     |
| July   | 3.27                 | 1.58    | 3.58                        |         | 1.89                          | 1.23    | .28                         | 1.75    | 1.97                     | 1.98    |
| Aug.   | 2.68                 | 1.51    | 3.03                        |         | 2.52                          | 1.35    | 1.10                        | 1.75    | 2.01                     | 1.83    |
| Sept.  | .59                  | 1.49    | .91                         |         | 1.38                          | 1.83    | 1.50                        | 1.92    | 1.85                     | 2.10    |
| Oct.   | .35                  | .99     | .16                         |         | .87                           | .99     | .71                         | .93     | .43                      | .66     |
| Nov.   | .39                  | .48     | .39                         |         | .08                           | .18     | .43                         | .56     | .12                      | .36     |
| Dec.   | .08                  | .51     | .12                         |         | .12                           | .32     | .20                         | .57     | .12                      | .41     |
| Yearly | 11.41                | 9.04    | 13.04                       |         | 9.92                          | 7.84    | 8.91                        | 10.00   | 12.02                    | 9.86    |

| Month  | San Agustin,<br>Chihuahua |         | Guadalupe,<br>Chihuahua |         | Praxedis G. Guerrero,<br>Chihuahua |         | Porvenir,<br>Chihuahua |         | Vado de Cedillos,<br>Chihuahua |         |
|--------|---------------------------|---------|-------------------------|---------|------------------------------------|---------|------------------------|---------|--------------------------------|---------|
|        | 1981                      | Average | 1981                    | Average | 1981                               | Average | 1981                   | Average | 1981                           | Average |
| Jan.   | 1.06                      | 0.40    | 1.22                    | 0.41    | 0.87                               | 0.33    | 0.83                   | 0.36    | 1.18                           | 0.40    |
| Feb.   | .24                       | .34     | .59                     | .38     | .16                                | .25     | .24                    | .36     | .43                            | .34     |
| Mar.   | .27                       | .22     | .20                     | .31     | .39                                | .21     | .31                    | .22     | .24                            | .21     |
| Apr.   | .20                       | .12     | .63                     | .18     | .94                                | .12     | .47                    | .14     | 1.06                           | .21     |
| May    | .35                       | .32     | 1.02                    | .38     | 1.18                               | .31     | 1.26                   | .46     | .87                            | .43     |
| June   | .63                       | .64     | 1.18                    | .74     | 1.06                               | .60     | .43                    | .81     | 1.77                           | 1.06    |
| July   | 2.01                      | 1.51    | 1.34                    | 1.77    | .55                                | 1.79    | 1.02                   | 1.67    | 1.34                           | 1.65    |
| Aug.   | 2.99                      | 1.30    | 4.88                    | 1.57    | 2.40                               | 1.33    | 3.07                   | 1.78    | 2.44                           | 1.87    |
| Sept.  | 1.42                      | 1.55    | 1.65                    | 1.65    | 1.69                               | 1.62    | 2.40                   | 1.93    | 2.36                           | 2.05    |
| Oct.   | .67                       | .77     | .75                     | .95     | 1.61                               | .89     | .16                    | .88     | .08                            | .96     |
| Nov.   | T                         | .28     | .08                     | .33     | .55                                | .37     | 0                      | .43     | 0                              | .42     |
| Dec.   | .08                       | .43     | .04                     | .30     | .39                                | .35     | 0                      | .44     | T                              | .49     |
| Yearly | 9.92                      | 7.88    | 13.58                   | 8.97    | 11.79                              | 8.17    | 10.19                  | 9.48    | 11.77                          | 10.09   |

| Month  | Los Barriles,<br>Chihuahua |         | Escuela de Agricultura<br>Escobar, Chihuahua |         | Banderas,<br>Chihuahua |         | Luis L. Leon,<br>Chihuahua |         | El Cuarenta,<br>Chihuahua |         |
|--------|----------------------------|---------|--|---------|------------------------|---------|----------------------------|---------|---------------------------|---------|
|        | 1981                       | Average | 1981   | Average | 1981                   | Average | 1981                       | Average | 1981                      | Average |
| Jan.   | 0.08                       | 0.33    | 2.09   | 1.22    | 0                      | 0.12    | 0.51                       | 0.37    | 1.34                      | 0.42    |
| Feb.   | .04                        | .21     | .47  | .45     | 0                      | .24     | 1.22                       | .31     | .35                       | .35     |
| Mar.   | .12                        | .19     | .31  | .30     | 0                      | .16     | .83                        | .23     | .39                       | .23     |
| Apr.   | .31                        | .11     | 1.22   | 1.08    | 0                      | .09     | .98                        | .21     | 1.93                      | .20     |
| May    | .20                        | .34     | .94  | .47     | 0                      | .21     | .47                        | .48     | .31                       | .30     |
| June   | .04                        | .93     | .35  | .18     | 0                      | .70     | 1.61                       | 1.19    | 1.69                      | .75     |
| July   | .04                        | 1.75    | 1.22   | 1.32    | 0                      | 1.10    | 1.02                       | 1.95    | 1.38                      | 2.04    |
| Aug.   | 1.61                       | 1.96    | 2.28   | 2.10    | 0                      | 1.66    | 2.09                       | 2.05    | 6.10                      | 2.84    |
| Sept.  | .12                        | 1.49    | .87  | 2.26    | .79                    | 1.89    | 1.77                       | 1.87    | 1.10                      | 2.01    |
| Oct.   | .04                        | .98     | .63  | .80     | 0                      | .86     | .35                        | 1.08    | 1.54                      | 1.03    |
| Nov.   | 0                          | .44     | .35  | .59     | 0                      | .28     | 0                          | .44     | 0                         | .48     |
| Dec.   | 0                          | .28     | .08  | .06     | 0                      | .21     | 0                          | .39     | 0                         | .43     |
| Yearly | 2.60                       | 9.01    | 10.81  | 10.83   | 0.79                   | 7.52    | 10.85                      | 10.57   | 16.13                     | 11.08   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO**  
**In Inches**

| Month  | El Cuelvo,<br>Chihuahua |         | Carichic,<br>Chihuahua |         | San Juanito,<br>Chihuahua |         | Siquirichic,<br>Chihuahua |         | El Vergel,<br>Chihuahua |         |
|--------|-------------------------|---------|------------------------|---------|---------------------------|---------|---------------------------|---------|-------------------------|---------|
|        | 1981                    | Average | 1981                   | Average | 1981                      | Average | 1981                      | Average | 1981                    | Average |
| Jan.   | 0.94                    | 0.23    | 1.30                   | 0.50    | 3.54                      | 2.00    | 4.02                      | 1.41    | 1.93                    | 1.31    |
| Feb.   | .20                     | .26     | .43                    | .47     | .75                       | 1.23    | 1.42                      | .68     | .35                     | .76     |
| Mar.   | .47                     | .12     | .67                    | .22     | 1.89                      | .55     | 1.65                      | .63     | 2.76                    | .61     |
| Apr.   | 2.36                    | .24     | .83                    | .20     | 1.26                      | 1.07    | 6.69                      | .54     | 2.13                    | .50     |
| May    | .31                     | .40     | .20                    | .38     | 0                         | .60     | .39                       | .51     | T                       | .73     |
| June   | 1.26                    | 1.32    | 3.94                   | 1.68    | 3.39                      | 1.82    | 4.21                      | 1.77    | 6.22                    | 3.10    |
| July   | 2.36                    | 2.40    | 5.67                   | 5.96    | 5.98                      | 10.02   | 6.69                      | 5.98    | 7.76                    | 6.87    |
| Aug.   | 2.05                    | 2.83    | 5.24                   | 4.91    | 6.14                      | 7.08    | 9.41                      | 5.75    | 9.92                    | 7.02    |
| Sept.  | 5.20                    | 3.00    | 8.66                   | 4.07    | 4.41                      | 4.52    | 8.86                      | 3.55    | 6.30                    | 5.03    |
| Oct.   | 1.89                    | .98     | 2.17                   | 1.11    | 3.11                      | 2.70    | 3.70                      | 1.60    | 5.55                    | 2.01    |
| Nov.   | 0                       | .31     | .12                    | .53     | 0                         | 1.06    | T                         | .48     | 0                       | .63     |
| Dec.   | 0                       | .16     | .20                    | .68     | .08                       | 1.49    | 2.36                      | 1.37    | .55                     | 1.26    |
| Yearly | 17.04                   | 12.25   | 29.43                  | 20.71   | 30.55                     | 34.14   | 49.40                     | 24.27   | 43.47                   | 29.83   |

| Month  | Balleza,<br>Chihuahua |         | El Sitio,<br>Chihuahua |         | La Boquilla,<br>Chihuahua |         | San Antonio,<br>Durango |         | Estacion Rosario,<br>Durango |         |
|--------|-----------------------|---------|------------------------|---------|---------------------------|---------|-------------------------|---------|------------------------------|---------|
|        | 1981                  | Average | 1981                   | Average | 1981                      | Average | 1981                    | Average | 1981                         | Average |
| Jan.   | 1.10                  | 0.35    | 0.94                   | 0.24    | 0.04                      | 0.28    | 0.98                    | 0.31    | 1.38                         | 0.27    |
| Feb.   | .28                   | .34     | .24                    | .32     | .51                       | .18     | .08                     | .16     | .08                          | .27     |
| Mar.   | .91                   | .15     | .20                    | .13     | .04                       | .15     | .16                     | .09     | .39                          | .14     |
| Apr.   | .98                   | .21     | 1.30                   | .20     | .79                       | .22     | .55                     | .28     | .83                          | .29     |
| May    | .16                   | .23     | .59                    | .40     | .51                       | .55     | 0                       | .58     | 0                            | .75     |
| June   | 2.05                  | 1.57    | 2.17                   | 1.63    | 3.15                      | 1.43    | 1.85                    | 1.97    | 3.78                         | 2.41    |
| July   | 2.80                  | 4.68    | 3.46                   | 4.34    | 4.09                      | 2.96    | 2.52                    | 4.59    | 3.23                         | 4.37    |
| Aug.   | 3.46                  | 4.88    | 7.83                   | 4.98    | 2.83                      | 2.97    | 5.91                    | 4.26    | 6.26                         | 5.22    |
| Sept.  | 4.49                  | 3.51    | 3.35                   | 3.75    | 2.76                      | 3.06    | 4.21                    | 4.47    | 3.94                         | 5.13    |
| Oct.   | 5.75                  | .92     | 3.11                   | .93     | 2.20                      | .91     | 3.27                    | 1.22    | 4.02                         | 1.26    |
| Nov.   | 0                     | .46     | 0                      | .38     | 0                         | .32     | 0                       | .26     | .08                          | .38     |
| Dec.   | .16                   | .46     | .04                    | .31     | 0                         | .34     | .87                     | .26     | 1.06                         | .40     |
| Yearly | 22.14                 | 17.76   | 23.23                  | 17.61   | 16.92                     | 13.37   | 20.40                   | 18.45   | 25.05                        | 20.89   |

| Month  | Villa Coronado,<br>Chihuahua |         | Ojo Caliente,<br>Chihuahua |         | Escalon,<br>Chihuahua |         | Jimenez,<br>Chihuahua |         | Parral,<br>Chihuahua |         |
|--------|------------------------------|---------|----------------------------|---------|-----------------------|---------|-----------------------|---------|----------------------|---------|
|        | 1981                         | Average | 1981                       | Average | 1981                  | Average | 1981                  | Average | 1981                 | Average |
| Jan.   | 1.89                         | 0.35    | 1.57                       | 0.21    | 1.26                  | 0.33    | 1.06                  | 0.22    | T                    | 0.18    |
| Feb.   | .24                          | .30     | .63                        | .23     | T                     | .19     | .28                   | .16     | .04                  | .21     |
| Mar.   | .12                          | .19     | .12                        | .15     | .24                   | .11     | .39                   | .11     | T                    | .09     |
| Apr.   | .75                          | .37     | 1.06                       | .18     | 2.01                  | .36     | .31                   | .13     | T                    | .19     |
| May    | .47                          | .66     | 1.14                       | .52     | 1.26                  | .71     | 1.26                  | .51     | 0                    | .45     |
| June   | 6.06                         | 2.91    | 3.70                       | 1.68    | 1.06                  | 1.72    | 1.81                  | 1.25    | .51                  | 1.66    |
| July   | 1.89                         | 3.87    | 2.64                       | 3.34    | .16                   | 2.45    | 1.26                  | 3.29    | 1.73                 | 4.22    |
| Aug.   | 5.28                         | 5.23    | 3.86                       | 2.88    | 2.09                  | 2.98    | 3.39                  | 2.50    | 5.35                 | 4.45    |
| Sept.  | 4.49                         | 4.46    | 2.36                       | 2.92    | 6.14                  | 2.85    | 1.06                  | 2.38    | 11.06                | 4.59    |
| Oct.   | 0                            | 1.29    | 3.54                       | 1.16    | 3.62                  | 1.23    | 2.99                  | 1.25    | 1.38                 | 1.15    |
| Nov.   | 1.10                         | .39     | 0                          | .21     | 0                     | .27     | 0                     | .24     | .35                  | .48     |
| Dec.   |                              | .43     | .16                        | .24     | .91                   | .35     | .35                   | .23     | 0                    | .36     |
| Yearly |                              | 20.45   | 20.78                      | 13.72   | 18.75                 | 13.55   | 14.16                 | 12.27   | 20.42                | 18.03   |

| Month  | Camargo,<br>Chihuahua |         | Victoria,<br>Chihuahua |         | Tacubaya,<br>Chihuahua |         | Nonoava,<br>Chihuahua |         | El Maguey,<br>Chihuahua |         |
|--------|-----------------------|---------|------------------------|---------|------------------------|---------|-----------------------|---------|-------------------------|---------|
|        | 1981                  | Average | 1981                   | Average | 1981                   | Average | 1981                  | Average | 1981                    | Average |
| Jan.   | 1.89                  | 0.38    | 1.46                   | 0.31    | 1.22                   | 0.25    | 0.91                  | 0.26    | 1.81                    | 0.28    |
| Feb.   | .35                   | .28     | .08                    | .54     | .08                    | .45     | .51                   | .38     | .59                     | .32     |
| Mar.   | .12                   | .12     | .24                    | .16     | .12                    | .12     | .51                   | .20     | .71                     | .14     |
| Apr.   | 1.10                  | .20     | 1.69                   | .29     | 1.65                   | .23     | .94                   | .18     | 2.20                    | .23     |
| May    | 1.30                  | .62     | 1.14                   | .81     | .31                    | .88     | .31                   | .40     | .59                     | .39     |
| June   | 3.58                  | 1.64    | 4.06                   | 2.04    | 4.09                   | 1.69    | 2.52                  | 1.86    | 1.61                    | 1.52    |
| July   | 2.52                  | 3.20    | 2.64                   | 3.24    | 2.68                   | 3.81    | 5.16                  | 5.21    | 4.53                    | 3.68    |
| Aug.   | 3.31                  | 2.98    | 6.14                   | 3.57    | 6.14                   | 2.72    | 6.30                  | 3.84    | 7.76                    | 4.25    |
| Sept.  | 3.07                  | 3.26    | 2.24                   | 3.70    | 2.28                   | 3.80    | 6.46                  | 3.02    | 3.62                    | 3.71    |
| Oct.   | 3.31                  | 1.09    | 5.04                   | .88     | 5.08                   | .97     | 2.60                  | 1.09    | 3.66                    | .94     |
| Nov.   | 0                     | .36     | 0                      | .27     | 0                      | .28     | 0                     | .39     | 0                       | .24     |
| Dec.   | .24                   | .32     | 0                      | .29     | 0                      | .46     | .39                   | .38     | 0                       | .27     |
| Yearly | 20.79                 | 14.45   | 24.73                  | 16.10   | 23.65                  | 15.66   | 26.61                 | 17.21   | 27.08                   | 15.97   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO**  
**In Inches**

| Month         | San Lorenzo,<br>Chihuahua |         | Villalba,<br>Chihuahua |         | Las Virgenes,<br>Chihuahua |         | Km. 135,<br>Chihuahua |         | Delicias,<br>Chihuahua |         |
|---------------|---------------------------|---------|------------------------|---------|----------------------------|---------|-----------------------|---------|------------------------|---------|
|               | 1981                      | Average | 1981                   | Average | 1981                       | Average | 1981                  | Average | 1981                   | Average |
| Jan.          | 2.24                      | 0.26    | 1.61                   | 0.32    | 1.54                       | 0.27    | 1.65                  | 0.15    | 1.57                   | 0.32    |
| Feb.          | .28                       | .17     | .28                    | .15     | .20                        | .13     | .04                   | .19     | .08                    | .15     |
| Mar.          | 1.30                      | .11     | .31                    | .06     | .71                        | .07     | .63                   | .10     | .79                    | .12     |
| Apr.          | 1.38                      | .13     | 1.85                   | .20     | 2.44                       | .24     | 3.70                  | .39     | 1.73                   | .30     |
| May           | .12                       | .43     | .31                    | .37     | .24                        | .33     | .20                   | .50     | .08                    | .33     |
| June          | 1.65                      | 1.51    | 3.43                   | 1.29    | 2.09                       | 1.17    | 1.73                  | 1.21    | 1.50                   | 1.15    |
| July          |                           | 4.35    | 1.42                   | 3.50    | 1.85                       | 2.56    | 1.42                  | 2.43    | 2.64                   | 2.48    |
| Aug.          | 10.55                     | 4.79    | 5.43                   | 3.07    | 3.15                       | 2.72    | 5.31                  | 2.83    | 3.70                   | 2.52    |
| Sept.         | 9.92                      | 5.08    | 5.59                   | 3.05    | 3.96                       | 2.56    | 2.64                  | 3.40    | 3.23                   | 2.36    |
| Oct.          | 1.10                      | .95     | 2.20                   | .99     | 3.50                       | .89     | 3.43                  | 1.05    | 2.36                   | .85     |
| Nov.          | 0                         | .42     | .24                    | .28     | 0                          | .23     | 0                     | .29     | 0                      | .25     |
| Dec.          | .16                       | .35     | 0                      | .34     | 0                          | .31     | 0                     | .27     | 0                      | .34     |
| <b>Yearly</b> |                           | 18.55   | 22.67                  | 13.62   | 19.68                      | 11.48   | 20.75                 | 12.81   | 17.68                  | 11.17   |

| Month         | Meoqui,<br>Chihuahua |         | Las Burras,<br>Chihuahua |         | Cd. Guerrero,<br>Chihuahua |         | Bachiniva,<br>Chihuahua |         | La Trasquila,<br>Chihuahua |         |
|---------------|----------------------|---------|--------------------------|---------|----------------------------|---------|-------------------------|---------|----------------------------|---------|
|               | 1981                 | Average | 1981                     | Average | 1981                       | Average | 1981                    | Average | 1981                       | Average |
| Jan.          | 1.89                 | 0.23    | 1.85                     | 0.26    | 2.52                       | 0.61    | 2.44                    | 0.49    | 1.89                       | 0.35    |
| Feb.          | .04                  | .19     | .04                      | .18     | .43                        | .42     | .31                     | .19     | .28                        | .30     |
| Mar.          | .79                  | .11     | .47                      | .12     | 1.22                       | .22     | .71                     | .31     | .55                        | .11     |
| Apr.          | 2.24                 | .43     | 2.05                     | .22     | .35                        | .19     | 1.18                    | .15     | .79                        | .15     |
| May           | 1.02                 | .51     | .51                      | .45     | .31                        | .32     | .08                     | .24     | .12                        | .31     |
| June          | 1.57                 | 1.29    | 2.83                     | 1.14    | 2.44                       | 1.53    | 2.56                    | 1.45    | 1.65                       | 1.28    |
| July          | 1.14                 | 2.61    | 2.13                     | 2.84    | 7.36                       | 4.86    | 5.67                    | 4.61    | 3.07                       | 2.78    |
| Aug.          | 2.52                 | 2.88    | 3.15                     | 2.65    | 2.80                       | 5.14    | 5.67                    | 2.80    | 3.82                       | 3.36    |
| Sept.         | 4.09                 | 2.70    | 1.81                     | 2.51    | 4.33                       | 3.19    | 2.56                    | 1.16    | 1.54                       | .82     |
| Oct.          | 1.93                 | 1.04    | 2.44                     | .83     | 2.99                       | 1.20    | 1.81                    | .32     | 0                          | .30     |
| Nov.          | 0                    | .22     | 0                        | .23     | T                          | .49     | 0                       | .41     | 0                          | .26     |
| Dec.          | T                    | .32     | 0                        | .33     | .08                        | .69     | .12                     |         |                            |         |
| <b>Yearly</b> | 17.23                | 12.53   | 17.28                    | 11.76   | 24.83                      | 18.86   | 23.11                   | 17.51   | 16.54                      | 13.62   |

| Month         | Cuauhtemoc,<br>Chihuahua |         | Colonia Anahuac,<br>Chihuahua |         | Presa Chihuahua,<br>Chihuahua |         | Majalca,<br>Chihuahua |         | Posta Zootecnica,<br>Chihuahua |         |
|---------------|--------------------------|---------|-------------------------------|---------|-------------------------------|---------|-----------------------|---------|--------------------------------|---------|
|               | 1981                     | Average | 1981                          | Average | 1981                          | Average | 1981                  | Average | 1981                           | Average |
| Jan.          | 2.17                     | 0.32    | 1.69                          | 0.33    | 1.57                          | 0.24    | 2.64                  | 0.42    | 1.73                           | 0.27    |
| Feb.          | .39                      | .15     | .39                           | .28     | 0                             | .20     | .28                   | .34     | T                              | .21     |
| Mar.          | .87                      | .13     | .83                           | .15     | .55                           | .15     | 1.06                  | .27     | .67                            | .15     |
| Apr.          | .94                      | .20     | 1.57                          | .29     | 1.18                          | .22     | 1.34                  | .33     | 2.17                           | .31     |
| May           | .55                      | .36     | 1.14                          | .57     | .31                           | .82     | 1.26                  | .79     | 1.38                           | .66     |
| June          | 2.80                     | 1.49    | 1.22                          | 1.54    | 1.54                          | 2.22    | 1.81                  | 2.40    | 2.52                           | 1.46    |
| July          | 7.13                     | 4.73    | 4.29                          | 4.71    | 2.76                          | 4.27    | 5.20                  | 6.16    | 5.87                           | 3.53    |
| Aug.          | 5.71                     | 4.25    | 5.94                          | 4.76    | 5.75                          | 4.53    | 10.63                 | 6.26    | 6.38                           | 3.98    |
| Sept.         | 7.05                     | 2.45    | 4.76                          | 3.93    | 6.30                          | 3.80    | 6.10                  | 5.08    | 8.11                           | 3.32    |
| Oct.          | 2.44                     | 1.16    | 2.72                          | 1.14    | 2.01                          | .99     | 2.01                  | 1.08    | 2.80                           | 1.10    |
| Nov.          | 0                        | .29     | 0                             | .33     | 0                             | .34     | 0                     | .39     | 0                              | .33     |
| Dec.          | .16                      | .37     | T                             | .22     | 0                             | .29     | 0                     | .34     | T                              | .31     |
| <b>Yearly</b> | 30.21                    | 16.40   | 24.55                         | 18.25   | 21.97                         | 18.07   | 32.33                 | 23.86   | 31.63                          | 15.63   |

| Month         | Villa Aldama,<br>Chihuahua |         | Presa Luis L. Leon,<br>Chihuahua |         | Maclovio Herrera<br>(Palomir), Chihuahua |         | Parrita,<br>Chihuahua |         | Maijoma,<br>Chihuahua |         |
|---------------|----------------------------|---------|----------------------------------|---------|--|---------|-----------------------|---------|-----------------------|---------|
|               | 1981                       | Average | 1981                             | Average | 1981                                     | Average | 1981                  | Average | 1981                  | Average |
| Jan.          | 0.94                       | 0.19    | 1.02                             | 0.12    | 1.02                                     | 0.31    | 1.54                  | 0.21    | 1.46                  | 0.39    |
| Feb.          | T                          | .17     | .04                              | .11     | T  | .18     | .08                   | .23     | .08                   | .33     |
| Mar.          | 2.91                       | .27     | .47                              | .14     | .39                                      | .13     | .75                   | .10     | .75                   | .19     |
| Apr.          | 2.99                       | .29     | 1.50                             | .27     | 2.72                                     | .35     | 2.28                  | .44     | 4.06                  | .36     |
| May           | .24                        | .42     | 1.10                             | .45     | .94                                      | .57     | .59                   | .40     | 1.54                  | .82     |
| June          | 3.70                       | 1.69    | 2.36                             | 1.24    | 2.60                                     | 1.18    | 2.80                  | 1.75    | 1.30                  | 1.57    |
| July          | 2.44                       | 2.90    | 1.42                             | 2.22    | .59                                      | 2.67    | 3.15                  | 2.53    | 3.35                  | 2.99    |
| Aug.          | 4.76                       | 3.03    | 4.69                             | 3.14    | 3.74                                     | 2.77    | 6.06                  | 3.32    | 5.65                  | 3.35    |
| Sept.         | 6.10                       | 3.60    | 3.50                             | 2.82    | 3.66                                     | 3.31    | 4.25                  | 3.35    | 2.83                  | 2.93    |
| Oct.          | 3.43                       | .85     | 2.44                             | .74     | 2.72                                     | .80     | 1.73                  | 1.05    | 4.33                  | 1.12    |
| Nov.          | 0                          | .31     | 0                                | .27     | 0  | .34     | 0                     | .31     | 0                     | .35     |
| Dec.          | 0                          | .31     | 0                                | .26     | 0  | .54     | 0                     | .18     | .04                   | .38     |
| <b>Yearly</b> | 27.51                      | 14.03   | 18.54                            | 11.78   | 18.38                                    | 13.15   | 23.23                 | 13.87   | 25.37                 | 14.78   |

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**RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO**  
**In Inches**

| Month         | Coyame,<br>Chihuahua |              | Gallego,<br>Chihuahua |              | El Sueco,<br>Chihuahua |              | Ojinaga (IR&WC),<br>Chihuahua |             | Ojinaga (M.S. of<br>Mexico), Chihuahua |             |
|---------------|----------------------|--------------|-----------------------|--------------|------------------------|--------------|-------------------------------|-------------|--|-------------|
|               | 1981                 | Average      | 1981                  | Average      | 1981                   | Average      | 1981                          | Average     | 1981                                   | Average     |
| Jan.          | 1.10                 | 0.20         | 1.06                  | 0.32         | 1.06                   | 0.41         | 0.55                          | 0.31        | 0.47                                   | 0.28        |
| Feb.          | .08                  | .31          | .35                   | .37          | .12                    | .39          | T                             | .23         | .12                                    | .23         |
| Mar.          | .71                  | .16          | .79                   | .19          | .83                    | .24          | .43                           | .18         | .55                                    | .21         |
| Apr.          | 2.52                 | .36          | 1.14                  | .21          | 3.58                   | .32          | 4.06                          | .36         | 3.31                                   | .31         |
| May           | .94                  | .58          | 1.22                  | .34          | 1.22                   | .34          | 1.22                          | .47         | 1.26                                   | .61         |
| June          | 2.95                 | 1.58         | 3.54                  | 1.08         | 2.24                   | .91          | 1.26                          | 1.32        | 1.10                                   | 1.15        |
| July          | 3.54                 | 2.47         | 5.83                  | 3.32         | 5.94                   | 3.26         | 2.17                          | 1.74        | 2.60                                   | 1.64        |
| Aug.          | 4.17                 | 2.42         | 5.94                  | 3.27         | 3.58                   | 3.48         | 1.97                          | 1.77        | 2.48                                   | 1.64        |
| Sept.         | 3.70                 | 3.06         | 2.95                  | 3.07         | 3.58                   | 3.33         | 1.22                          | 1.78        | 1.34                                   | 1.66        |
| Oct.          | 2.68                 | .96          | 1.57                  | 1.28         | 1.38                   | 1.14         | 2.29                          | 1.04        | 2.91                                   | 1.04        |
| Nov.          | 0                    | .42          | 0                     | .31          | 0                      | .42          | 0                             | .42         | 0                                      | .37         |
| Dec.          | 0                    | .16          | 0                     | .24          | 0                      | .30          | T                             | .31         | .04                                    | .39         |
| <b>Yearly</b> | <b>22.39</b>         | <b>12.68</b> | <b>24.39</b>          | <b>14.00</b> | <b>23.53</b>           | <b>14.54</b> | <b>15.17</b>                  | <b>9.93</b> | <b>16.18</b>                           | <b>9.53</b> |

| Month         | Manuel Benavides,<br>Chihuahua |              | Sierra Mojada,<br>Coahuila |      |              |  | Ejido Eutimias,<br>Coahuila |             | San Fernando,<br>Coahuila |              |
|---------------|--------------------------------|--------------|----------------------------|------|--------------|--|-----------------------------|-------------|---------------------------|--------------|
|               | 1981                           | Average      | 1980                       | 1981 | Average      |  | 1981                        | Average     | 1981                      | Average      |
| Jan.          | 0.91                           | 0.16         |                            | 2.48 | 0.55         |  | 0.75                        | 0.25        | 1.06                      | 0.31         |
| Feb.          | T                              | .23          | .04                        | .08  | .29          |  | .24                         | .12         | .71                       | .57          |
| Mar.          | .20                            | .25          | .12                        |      | .27          |  | .20                         | .12         | 1.02                      | .42          |
| Apr.          | 1.73                           | .34          |                            | 2.60 | .32          |  | 4.92                        | .91         | 6.26                      | 1.26         |
| May           | 2.05                           | 1.13         | .24                        |      | .99          |  | 1.10                        | 1.04        | 5.35                      | 1.55         |
| June          | .98                            | 1.31         | .08                        | 2.91 | 2.24         |  | 2.64                        | 1.30        | .55                       | 1.11         |
| July          | 1.77                           | 2.22         | .04                        |      | 2.87         |  | 1.10                        | 1.90        | 0                         | 1.25         |
| Aug.          | 1.85                           | 2.38         | 2.80                       | 3.07 | 2.91         |  | 1.42                        | .87         | 2.83                      | 2.13         |
| Sept.         | 2.28                           | 3.03         | 2.83                       | 3.11 | 3.05         |  | .87                         | 1.38        | 0                         | 2.89         |
| Oct.          | 5.12                           | 1.03         | 1.02                       | 4.57 | 1.35         |  | 4.92                        | .89         | .55                       | 1.66         |
| Nov.          | 0                              | .27          | 1.73                       |      | .53          |  | 0                           | .35         | 0                         | .69          |
| Dec.          | T                              | .30          | 0                          |      | .62          |  | .47                         | .04         | .04                       | .39          |
| <b>Yearly</b> | <b>16.89</b>                   | <b>12.65</b> |                            |      | <b>15.99</b> |  |                             | <b>9.60</b> | <b>18.37</b>              | <b>14.23</b> |

| Month         | Santa Rosa,<br>Coahuila |              | Hacienda San Miguel,<br>Coahuila |              | Rancho La Chuparroa,<br>Coahuila |              | Presa Centenario,<br>Coahuila |              | Amistad Res. near<br>Tlaloc, Coahuila |              |
|---------------|-------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|-------------------------------|--------------|---------------------------------------|--------------|
|               | 1981                    | Average      | 1981                             | Average      | 1981                             | Average      | 1981                          | Average      | 1981                                  | Average      |
| Jan.          | 0                       | 0.64         | 0.28                             | 0.34         | 0.55                             | 0.18         | 0.79                          | 0.50         | 0.60                                  | 0.42         |
| Feb.          | 0                       | .77          | 0                                | .59          | .39                              | .42          | .16                           | .74          | .27                                   | .56          |
| Mar.          | 0                       | .52          | .87                              | .63          | .42                              | .48          | 1.34                          | .63          | 2.52                                  | .88          |
| Apr.          | 0                       | .90          | 6.85                             | 1.95         | 7.74                             | 1.55         | 5.47                          | 1.70         | .50                                   | 1.32         |
| May           | 0                       | 1.23         | 3.46                             | 2.66         | 1.36                             | 1.22         | 1.81                          | 2.01         | 1.75                                  | 1.77         |
| June          | 2.52                    | 1.82         | 6.38                             | 2.16         | 2.67                             | 1.57         | 5.12                          | 2.33         | 4.60                                  | 2.44         |
| July          | 0                       | 1.47         | 1.34                             | 1.76         | .47                              | 1.90         | .31                           | 1.55         | 0                                     | 2.48         |
| Aug.          | .39                     | 1.91         | .47                              | 1.69         | 1.34                             | 2.50         | .47                           | 2.68         | .65                                   | 2.75         |
| Sept.         | 0                       | 2.34         | 0                                | 2.98         | .52                              | 2.23         | 0                             | 3.58         | .60                                   | 2.88         |
| Oct.          | .98                     | 2.15         | 1.46                             | 1.53         | 1.64                             | 1.82         | 5.04                          | 2.64         | 3.70                                  | 2.11         |
| Nov.          | 0                       | .81          | 0                                | .63          | 0                                | .48          | 0                             | 1.03         | 0                                     | .67          |
| Dec.          | 0                       | .37          | .04                              | .38          | 0                                | .24          | 0                             | .49          | 0                                     | .40          |
| <b>Yearly</b> | <b>3.89</b>             | <b>14.93</b> | <b>21.15</b>                     | <b>17.30</b> | <b>17.10</b>                     | <b>14.59</b> | <b>20.51</b>                  | <b>19.88</b> | <b>15.19</b>                          | <b>18.68</b> |

| Month         | La Amistad,<br>Coahuila |              | Represa Amistad,<br>Coahuila |              | Cd. Acuna,<br>Coahuila |              | Presa Cabeceras,<br>Coahuila |              | Presa San Miguel,<br>Coahuila |              |
|---------------|-------------------------|--------------|------------------------------|--------------|------------------------|--------------|------------------------------|--------------|-------------------------------|--------------|
|               | 1981                    | Average      | 1981                         | Average      | 1981                   | Average      | 1981                         | Average      | 1981                          | Average      |
| Jan.          | 0.67                    | 0.44         | 0.55                         | 0.29         | 0.87                   | 0.53         | 1.10                         | 0.52         | 1.06                          | 0.47         |
| Feb.          | .12                     | .55          | .08                          | .54          | .35                    | .84          | .51                          | .65          | .20                           | .69          |
| Mar.          | 1.81                    | .95          | .59                          | .64          | 1.61                   | .74          | 1.26                         | .68          | 1.54                          | .71          |
| Apr.          | 8.46                    | 2.76         | 3.39                         | 1.32         | 6.65                   | 1.85         | 7.80                         | 1.88         | 7.76                          | 1.55         |
| May           | 1.57                    | 1.67         | 2.76                         | 1.44         | 2.13                   | 2.30         | 2.28                         | 2.62         | 1.50                          | 2.43         |
| June          | 3.98                    | 3.09         | 5.43                         | 1.67         | 2.60                   | 2.22         | 5.04                         | 2.49         | 5.43                          | 2.68         |
| July          | .39                     | .72          | .31                          | .28          | .94                    | .71          | .20                          | .76          | .51                           | 1.73         |
| Aug.          | .91                     | .69          | 1.02                         | 2.10         | .91                    | 1.88         | 0                            | 3.14         | .20                           | 3.00         |
| Sept.         | .08                     | 1.50         | .12                          | 2.48         | .04                    | .96          | 1.38                         | 4.34         | 1.85                          | 3.57         |
| Oct.          | 4.33                    | 1.96         | 3.98                         | 2.34         | 9.80                   | 2.63         | 2.24                         | 2.73         | 4.61                          | 2.29         |
| Nov.          | 0                       | 1.34         | 0                            | .77          | 0                      | .73          | 0                            | 1.22         | 0                             | 1.14         |
| Dec.          | 0                       | .31          | 0                            | .32          | .08                    | .55          | 0                            | .46          | 0                             | .43          |
| <b>Yearly</b> | <b>22.32</b>            | <b>15.98</b> | <b>18.23</b>                 | <b>15.99</b> | <b>25.98</b>           | <b>18.94</b> | <b>21.81</b>                 | <b>23.49</b> | <b>24.66</b>                  | <b>20.69</b> |

T Trace

## RAINFALL ON THE RIO GRANDE WATERSHED

## IN MEXICO

In Inches

| Month  | Palestina,<br>Coahuila |         | San Carlos,<br>Coahuila |         | Ejido San Miguel,<br>Coahuila |      |      |         | Emiliano Zapata,<br>Coahuila |         |
|--------|------------------------|---------|-------------------------|---------|-------------------------------|------|------|---------|------------------------------|---------|
|        | 1981                   | Average | 1981                    | Average | 1979                          | 1980 | 1981 | Average | 1981                         | Average |
| Jan.   | 1.14                   | 0.85    | 0.91                    | 0.49    | 0.20                          |      | 1.02 | 0.51    | 4.80                         | 1.49    |
| Feb.   | .59                    | .93     | 0                       | .74     | .91                           | 0    | 0    | .18     | .31                          | .47     |
| Mar.   | 2.09                   | .74     | 1.61                    | .49     | .43                           | .12  | 0    | .13     | 1.61                         | .94     |
| Apr.   | 7.01                   | 1.89    | 4.88                    | 1.82    | .59                           | 0    | 4.17 | 1.19    | 7.05                         | 2.57    |
| May    | 2.52                   | 2.42    |                         | 2.05    | 1.14                          | 0    | 2.24 | 1.01    | 1.02                         | 3.39    |
| June   | 6.81                   | 2.38    | .24                     | 2.13    | 3.58                          | .12  | 1.10 | 1.46    | 5.12                         | 3.36    |
| July   | .55                    | 1.98    | .63                     | 1.93    | .35                           | .67  | 1.57 | .86     | .51                          | 2.85    |
| Aug.   | .20                    | 2.39    | .98                     | 2.48    | 3.27                          | 3.50 |      | 2.66    | .59                          | 2.61    |
| Sept.  | .24                    | 3.10    | 2.13                    | 3.08    | .79                           | 2.13 | .55  | 1.51    | .47                          | 1.38    |
| Oct.   | 5.59                   | 2.27    | 4.37                    | 1.98    | 0                             | .04  |      | .75     | 2.60                         | 1.77    |
| Nov.   | 0                      | .87     | 0                       | 1.15    |                               |      |      | .46     | 0                            | 2.06    |
| Dec.   | 0                      | .72     | T                       | .44     | .16                           | 0    | 0    | .25     | 0                            | .67     |
| Yearly | 26.74                  | 20.54   |                         | 18.78   | 11.46                         |      |      | 10.97   | 24.08                        | 23.56   |

| Month  | Jimenez,<br>Coahuila |         | El Remolino,<br>Coahuila |         | Piedras Negras,<br>Coahuila |         | Zaragoza,<br>Coahuila |       |       |         |
|--------|----------------------|---------|--------------------------|---------|-----------------------------|---------|-----------------------|-------|-------|---------|
|        | 1981                 | Average | 1981                     | Average | 1981                        | Average | 1979                  | 1980  | 1981  | Average |
| Jan.   | 0.87                 | 0.68    | 1.57                     | 0.42    | 1.06                        | 0.69    | 0.31                  | 0.04  | 1.30  | 0.55    |
| Feb.   | .24                  | .85     | .98                      | .56     | .31                         | .90     | 0                     | .35   | .18   |         |
| Mar.   | 1.06                 | .74     | 1.97                     | .43     | 1.10                        | .66     | 1.81                  | .28   | 1.10  | 1.06    |
| Apr.   | 6.02                 | 1.82    | 8.74                     | 1.62    | 7.91                        | 2.13    | 1.34                  | .87   | 11.02 | 4.41    |
| May    | 1.18                 | 2.52    | 2.52                     | 2.16    | 5.55                        | 3.56    | 4.29                  | 6.38  | 3.19  | 4.62    |
| June   | 3.94                 | 2.60    | 2.76                     | 3.43    | 5.35                        | 2.57    | 3.46                  | 0     | 5.20  | 2.89    |
| July   | .24                  | 1.66    | 0                        | 2.47    | .94                         | 2.07    | .31                   | T     | 1.22  | .51     |
| Aug.   | .47                  | 1.78    | .98                      | 1.98    | 2.17                        | 2.61    | .28                   | 6.46  | .47   | 1.88    |
| Sept.  | 1.69                 | 2.90    | 1.42                     | 3.83    | 1.02                        | 3.11    | .55                   | 3.38  | 1.42  | 1.42    |
| Oct.   | 1.26                 | 2.46    | 0                        | 2.63    | 1.26                        | 2.76    | 0                     | .94   | 1.46  | 1.24    |
| Nov.   | T                    | 1.13    | 0                        | .54     | 0                           | .87     | .94                   | 3.82  | 0     | 1.25    |
| Dec.   | .24                  | .63     | 0                        | .35     | .16                         | .61     | .39                   | .31   | .12   | .27     |
| Yearly | 17.21                | 19.77   | 20.94                    | 20.42   | 26.83                       | 22.54   |                       | 22.48 | 26.85 | 20.28   |

| Month  | Allende,<br>Coahuila |      |       |         | Guerrero,<br>Coahuila |         | Rancho San Diego,<br>Coahuila |         | Villa Hidalgo,<br>Coahuila |         |
|--------|----------------------|------|-------|---------|-----------------------|---------|-------------------------------|---------|----------------------------|---------|
|        | 1979                 | 1980 | 1981  | Average | 1981                  | Average | 1981                          | Average | 1981                       | Average |
| Jan.   | 0.24                 | 0.12 | 0.51  | 0.56    | 2.13                  | 0.56    | 0                             | 0.22    | 1.50                       | 0.74    |
| Feb.   | .39                  | 0    | .16   | .88     | 0                     | .62     | .20                           | .45     | .24                        | .87     |
| Mar.   | .35                  | 0    | .91   | .42     | 2.36                  | .53     | 0                             | .31     | 3.23                       | .71     |
| Apr.   | 1.93                 | 1.65 | 11.02 | 1.44    | 12.48                 | 1.99    | 5.91                          | 1.22    | 5.79                       | 1.77    |
| May    | .47                  |      | 2.95  | 2.56    | 5.87                  | 2.95    | 1.97                          | 2.42    | 6.46                       | 2.87    |
| June   | .83                  |      | 4.09  | 2.20    | 7.52                  | 2.69    | .79                           | 1.62    | 6.10                       | 2.29    |
| July   | .63                  |      | .24   | 1.82    | 0                     | 1.65    | 0                             | 1.26    | 2.68                       | 1.18    |
| Aug.   | .55                  |      | 1.73  | 2.63    | 1.26                  | 2.25    | 1.18                          | 1.21    | 5.35                       | 2.46    |
| Sept.  | .20                  | 7.64 | 1.42  | 3.64    | 0                     | 3.52    | 1.18                          | 2.84    | 8.19                       | 3.67    |
| Oct.   | 0                    | .08  | 2.68  | 2.04    | 2.56                  | 2.66    | .59                           | 1.24    | 4.49                       | 2.10    |
| Nov.   | .83                  | 4.09 | 0     | .83     | 0                     | .70     | 0                             | .64     | 0                          | .95     |
| Dec.   | .31                  | .35  | .04   | .61     | .31                   | .55     | 0                             | .43     | 0                          | .71     |
| Yearly | 6.73                 |      | 25.75 | 19.63   | 34.49                 | 20.67   | 11.82                         | 13.86   | 44.03                      | 20.32   |

| Month  | Colombia (IB&WC),<br>Nuevo Leon |         | Colombia (SARH),<br>Nuevo Leon |       |         |      | Rancho Vidrios,<br>Tamaulipas |         | Nv. Laredo (M. S.<br>of Mexico), Tamps. |         |
|--------|---------------------------------|---------|--------------------------------|-------|---------|------|-------------------------------|---------|---|---------|
|        | 1981                            | Average | 1980                           | 1981  | Average |      | 1981                          | Average | 1981                                    | Average |
| Jan.   | 1.89                            | 0.46    |                                | 1.46  | 1.68    |      | 1.57                          | 0.77    | 1.69                                    | 0.79    |
| Feb.   | .75                             | .66     |                                | .24   | .30     |      | .28                           | .82     | .35                                     | .88     |
| Mar.   | 4.13                            | .94     |                                | 2.40  | 1.22    |      | 1.89                          | .53     | 2.44                                    | .64     |
| Apr.   | 3.70                            | 1.94    |                                | 3.94  | 3.33    |      | 3.74                          | 1.63    | 3.94                                    | 1.28    |
| May    | 7.32                            | 3.18    |                                | 3.39  | 3.39    |      | 7.60                          | 3.18    | 6.54                                    | 2.54    |
| June   | 5.91                            | 2.29    |                                | 4.29  | 2.14    |      | 2.76                          | 1.53    | 1.57                                    | 1.32    |
| July   | 2.36                            | 1.55    | 0                              | 1.57  | .52     |      | 5.31                          | 2.49    | 1.89                                    | 1.71    |
| Aug.   | 4.72                            | 3.29    | 0                              | 1.14  | .57     |      | 3.55                          | .55     | 2.95                                    |         |
| Sept.  |                                 | 4.14    | 2.48                           |       | .08     | 2.43 | 7.48                          | 2.57    | 6.54                                    | 1.71    |
| Oct.   | 3.46                            | 1.92    | 0                              | 4.84  | 3.46    |      | 0                             | 1.16    | 0                                       | .97     |
| Nov.   | 0                               | 1.04    | 0                              | 1.08  |         |      | 0                             | .86     | .16                                     | .85     |
| Dec.   | 0                               | .70     | .35                            | 0     | .84     |      |                               |         |   |         |
| Yearly |                                 | 22.11   |                                | 23.35 | 20.96   |      |                               | 21.20   | 29.73                                   | 17.93   |

T Trace

## RAINFALL ON THE RIO GRANDE WATERSHED

## IN MEXICO

In Inches

| Month  | Nv. Laredo (IB&WC),<br>Tamaulipas |         | Jarita,<br>Nuevo Leon |       |         |  | Nuevo Laredo (Sur),<br>Tamaulipas |         | Nuevo Laredo Km. 26<br>SSW, Tamaulipas |         |
|--------|-----------------------------------|---------|-----------------------|-------|---------|--|-----------------------------------|---------|--|---------|
|        | 1981                              | Average | 1980                  | 1981  | Average |  | 1981                              | Average | 1981                                   | Average |
| Jan.   | 2.05                              | 0.68    |                       | 1.89  | 0.47    |  | 1.93                              | 0.68    | 1.65                                   | 0.73    |
| Feb.   | .47                               | .89     |                       | .12   | .89     |  | .71                               | .50     | .71                                    | .95     |
| Mar.   | 2.76                              | .51     |                       | 2.60  | .61     |  | 1.97                              | .62     | 1.93                                   | .49     |
| Apr.   | 3.35                              | 1.38    |                       | 2.32  | 1.53    |  | 3.19                              | 1.96    | 4.65                                   | 1.91    |
| May    | 7.40                              | 2.97    |                       | 8.15  | 3.01    |  | 7.28                              | 3.90    | 9.53                                   | 2.94    |
| June   | 5.94                              | 2.77    |                       | 1.97  | 1.78    |  | 2.95                              | 2.23    | 2.76                                   | 2.30    |
| July   | 4.49                              | 1.45    |                       | .28   | .67     |  | 1.22                              | 2.48    | .39                                    | 1.75    |
| Aug.   | 2.24                              | 2.48    | 6.85                  | 3.70  | 2.66    |  | 2.05                              | 2.13    | .47                                    | 2.35    |
| Sept.  | 1.34                              | 3.31    | .98                   | 1.38  | 3.55    |  | 1.10                              | 2.46    | .20                                    | 3.28    |
| Oct.   | 5.67                              | 2.08    | 1.02                  | 5.91  | 1.68    |  | 4.72                              | 2.65    | 1.97                                   | 2.03    |
| Nov.   | T                                 | .99     | 1.18                  | 0     | 1.34    |  | 0                                 | .95     | 0                                      | 1.14    |
| Dec.   | .24                               | .72     | .83                   | .66   |         |  | 0                                 | .43     | 0                                      | .63     |
| Yearly | 35.95                             | 20.23   |                       | 18.85 |         |  | 27.12                             | 20.99   | 24.26                                  | 20.50   |

| Month  | Rancho Las Espuelas,<br>Tamaulipas |         | San Ignacio,<br>Tamaulipas |         | Muzquiz,<br>Coahuila |         | Sabinas,<br>Coahuila |         | Ejido 1o. de Mayo,<br>Coahuila |         |
|--------|------------------------------------|---------|----------------------------|---------|----------------------|---------|----------------------|---------|--------------------------------|---------|
|        | 1981                               | Average | 1981                       | Average | 1981                 | Average | 1981                 | Average | 1981                           | Average |
| Jan.   | 2.60                               | 0.86    | 1.77                       | 0.64    | 3.66                 | 0.80    | 2.91                 | 0.60    | 1.26                           | 0.63    |
| Feb.   | .71                                | .93     | .79                        | .90     | 0                    | .55     | 0                    | .66     | .20                            |         |
| Mar.   | 2.09                               | .94     | 2.95                       | .51     | .94                  | .79     | .55                  | .39     |                                |         |
| Apr.   | 5.31                               | 1.90    | 3.35                       | 1.50    | 6.06                 | 1.13    | 7.32                 | 1.33    | 4.84                           | 2.42    |
| May    | 7.99                               | 4.03    | 8.07                       | 2.88    | 1.18                 | 3.65    | 4.53                 | 2.52    | 1.85                           | 1.68    |
| June   | 10.31                              | 3.10    | 5.71                       | 2.44    | 6.50                 | 3.36    | 1.54                 | 2.13    | 1.50                           |         |
| July   | 4.61                               | 3.29    | 1.65                       | 1.36    | 2.24                 | 2.73    | .83                  | 1.42    |                                |         |
| Aug.   | 1.89                               | 2.14    | 1.57                       | 2.59    | 3.74                 | 2.71    | 3.27                 | 2.11    |                                |         |
| Sept.  | .20                                | 4.10    | .08                        | 3.51    | 4.09                 | 4.91    | 1.93                 | 3.41    | .28                            | .14     |
| Oct.   | 3.50                               | 2.46    | 5.12                       | 2.63    | 2.68                 | 2.17    | 2.44                 | 1.77    | 3.58                           | 2.04    |
| Nov.   | 0                                  | 1.12    | 0                          | 1.15    | 0                    | 1.07    | 0                    | .64     | 0                              | .59     |
| Dec.   | 0                                  | .86     | 0                          | .67     | 0                    | .83     |                      | .51     | .08                            | .04     |
| Yearly | 39.21                              | 25.73   | 31.06                      | 20.78   | 31.09                | 24.70   |                      | 17.49   |                                |         |

| Month  | Juarez,<br>Coahuila |         | Cuatro Cienegas,<br>Coahuila |         | Ocampo,<br>Coahuila |         | Progreso,<br>Coahuila |         | San Buenaventura,<br>Coahuila |         |
|--------|---------------------|---------|------------------------------|---------|---------------------|---------|-----------------------|---------|-------------------------------|---------|
|        | 1981                | Average | 1981                         | Average | 1981                | Average | 1981                  | Average | 1981                          | Average |
| Jan.   | 4.49                | 0.66    | 0.87                         | 0.31    | 1.30                | 0.38    | 2.09                  | 0.50    |                               | 0.58    |
| Feb.   | .79                 | .53     | 0                            | .36     | 0                   | .25     | .24                   | .51     |                               | .49     |
| Mar.   | 2.91                | .49     | .39                          | .12     | 0                   | .18     | .75                   | .37     |                               | .37     |
| Apr.   | 9.06                | 1.49    | 3.11                         | .36     | 5.20                | .88     | 7.32                  | 1.24    | 4.88                          | .87     |
| May    | 5.71                | 2.22    | 1.14                         | .79     | 3.15                | 1.26    | 2.56                  | 2.22    | 3.54                          | 1.48    |
| June   | 4.37                | 1.68    | .47                          | .70     | 4.76                | 1.50    | 2.64                  | 1.65    |                               | 1.56    |
| July   | 1.00                | .94     | .83                          | .67     | 1.71                | 1.81    | 1.81                  | 1.08    | .91                           | 1.59    |
| Aug.   | 1.30                | .51     | 1.15                         | .35     | 1.52                | 2.09    | 1.96                  |         |                               | 1.80    |
| Sept.  | 3.19                | 3.18    | .12                          | 1.46    | .47                 | 2.15    | .24                   | 2.99    | .28                           | 2.37    |
| Oct.   |                     | 1.66    | .76                          | 3.98    | 1.14                | 4.13    | 1.83                  | 6.81    | 1.44                          |         |
| Nov.   | 1.61                | .70     | T                            | .40     | 0                   | .48     | T                     | .58     | T                             | .56     |
| Dec.   | .35                 | .49     | .20                          | .44     | .24                 | .43     | .24                   | .50     |                               | .65     |
| Yearly |                     | 15.40   |                              | 7.68    | 20.12               | 11.88   | 24.11                 | 15.43   |                               | 13.76   |

| Month  | Castanos,<br>Coahuila |         | Presa Carranza,<br>Coahuila |         | Laguna de Salinillas,<br>Nuevo Leon |         | Candela,<br>Coahuila |         | Lampazos,<br>Nuevo Leon |         |
|--------|-----------------------|---------|-----------------------------|---------|-------------------------------------|---------|----------------------|---------|-------------------------|---------|
|        | 1981                  | Average | 1981                        | Average | 1981                                | Average | 1981                 | Average | 1981                    | Average |
| Jan.   |                       | 0.54    | 1.73                        | 0.70    | 2.17                                | 0.63    | 3.31                 | 0.59    | 2.52                    | 0.65    |
| Feb.   |                       | .52     | .28                         | .63     | .51                                 | .62     |                      | .53     | .28                     | .78     |
| Mar.   | 0.39                  | .25     | 1.18                        | .49     | 1.50                                | .56     |                      | .12     | .87                     | .50     |
| Apr.   | 6.89                  | .97     | 6.18                        | 1.27    | 10.12                               | 1.27    | 6.42                 | 1.37    | 5.24                    | 1.16    |
| May    |                       | 1.60    | 3.50                        | 2.08    | 4.29                                | 2.23    | 4.80                 | 1.40    | 4.76                    | 2.30    |
| June   |                       | 1.86    | 4.65                        | 1.81    | 4.37                                | 2.00    | 2.20                 | 1.79    | 6.38                    | 2.92    |
| July   |                       | 1.40    | .59                         | 1.06    | .31                                 | 1.05    | 2.80                 | 2.59    | 3.15                    | 2.04    |
| Aug.   | 3.15                  | 2.34    | 1.81                        | 2.00    | 1.26                                | 2.40    | 4.61                 | 2.25    | 2.20                    | 1.95    |
| Sept.  | 1.10                  | 2.77    | 1.14                        | 2.98    | .79                                 | 3.32    | .43                  | 3.06    | .12                     | 5.16    |
| Oct.   | 5.16                  | 1.84    | 4.84                        | 1.73    | 6.97                                | 2.04    | 3.86                 | 1.42    | 7.28                    | 2.08    |
| Nov.   |                       | .37     | .08                         | .59     | T                                   | .72     |                      | .71     | 0                       | .75     |
| Dec.   | T                     | .30     | .16                         | .61     | .16                                 | .56     | 0                    | .42     | .16                     | .55     |
| Yearly |                       | 14.76   | 26.14                       | 15.95   | 32.45                               | 17.40   |                      | 16.25   | 32.96                   | 20.84   |

T Trace

## RAINFALL ON THE RIO GRANDE WATERSHED

## IN MEXICO

In Inches

| Month  | San Nicolas,<br>Nuevo Leon |         | Anahuac,<br>Nuevo Leon |         | Rio Salado, Carr. 85,<br>Nuevo Leon |         | Espinazo,<br>Nuevo Leon |         | Bustamante,<br>Nuevo Leon |         |
|--------|----------------------------|---------|------------------------|---------|-------------------------------------|---------|-------------------------|---------|---------------------------|---------|
|        | 1981                       | Average | 1981                   | Average | 1981                                | Average | 1981                    | Average | 1981                      | Average |
| Jan.   | 2.09                       | 1.14    | 2.36                   | 0.71    | 3.31                                | 0.59    | 4.06                    | 2.07    | 2.60                      | 0.61    |
| Feb.   | .51                        | .69     | .59                    | .62     | .67                                 | .75     | .31                     | .57     | 1.77                      | .80     |
| Mar.   | 1.69                       | 1.22    | 1.85                   | .52     | 1.18                                | .41     | .94                     | .47     | 10.59                     | .89     |
| Apr.   | 5.28                       | 3.96    | T                      | 1.12    | 6.61                                | 1.32    | 4.49                    | 2.68    |                           | .94     |
| May    | 5.71                       | 3.42    | 7.60                   | 2.32    | 3.94                                | 2.45    | 2.17                    | 1.50    |                           | 1.37    |
| June   | 3.58                       | 4.00    | 8.15                   | 2.04    | 2.83                                | 2.81    | .63                     |         |                           | 3.03    |
| July   | .87                        | .38     | .28                    | 1.38    | .67                                 | 2.35    | 2.01                    | 1.40    |                           | 2.01    |
| Aug.   | 2.83                       | 3.70    | 4.06                   | 2.42    | 1.73                                | 1.95    | 1.38                    | 1.46    |                           | 3.42    |
| Sept.  | .67                        | 2.84    | .31                    | 3.26    | .59                                 | 4.38    | 1.02                    | .72     | 2.13                      | 5.96    |
| Oct.   | 4.29                       | 2.05    | 3.46                   | 1.69    | 2.32                                | 1.81    | 2.68                    | 2.09    |                           | 2.19    |
| Nov.   | .38                        | T       | .68                    | 0       | .79                                 | 0       | .57                     |         |                           | .96     |
| Dec.   | .24                        | .65     | .12                    | .70     | .16                                 | .60     | .08                     | .12     |                           | .56     |
| Yearly |                            | 24.43   | 28.78                  | 17.46   | 24.01                               | 20.21   | 19.77                   | 14.40   |                           | 22.74   |

| Month  | Villaldama,<br>Nuevo Leon |      |       |         | Alamo,<br>Nuevo Leon |         | Ojo de Agua<br>(Sabinas), N. L. |         | Sabinas Hidalgo,<br>Nuevo Leon |         |
|--------|---------------------------|------|-------|---------|----------------------|---------|---------------------------------|---------|--------------------------------|---------|
|        | 1979                      | 1980 | 1981  | Average | 1981                 | Average | 1981                            | Average | 1981                           | Average |
| Jan.   | 0.16                      | 2.83 | 1.50  | 2.60    |                      |         | 2.64                            | 1.44    | 3.98                           | 0.59    |
| Feb.   | .47                       | .43  | .45   | 1.34    |                      |         | .59                             | .69     | .59                            | .77     |
| Mar.   |                           | .87  | .87   | 1.22    |                      |         | 1.26                            | .63     | 1.06                           | .69     |
| Apr.   | 2.76                      | 0    | 6.46  | 3.07    | 3.62                 |         | 5.75                            | 2.88    | 6.97                           | 1.36    |
| May    | .20                       | 2.16 | 1.22  | 1.19    | 3.98                 |         | 3.62                            | 2.48    | 2.95                           | 2.22    |
| June   | .87                       | .67  | 7.83  | 3.12    | 5.71                 |         | 3.43                            | 1.82    | 2.24                           | 3.84    |
| July   | .75                       | .79  | 2.87  | 1.47    | 1.57                 |         | 1.34                            | 1.56    | 1.10                           | 2.78    |
| Aug.   | 3.31                      | 5.28 | 3.11  | 3.90    | 1.54                 |         | 5.04                            | 4.96    | 4.80                           | 2.53    |
| Sept.  | 4.68                      |      | 3.43  | 4.06    | 2.32                 |         | 1.42                            | 3.11    | .12                            | 6.72    |
| Oct.   | 0                         | 1.38 | 3.31  | 1.56    | 2.76                 |         | 1.69                            | 1.44    | 1.77                           | 2.64    |
| Nov.   | .12                       | 2.36 | 0     | .83     | 0                    |         | 0                               | .73     | 0                              | 1.02    |
| Dec.   | 1.50                      | .04  | .04   | .53     |                      |         | 0                               | .08     | 0                              | .56     |
| Yearly |                           |      | 32.40 | 22.55   |                      |         | 26.78                           | 21.82   | 25.58                          | 25.72   |

| Month  | Garza Ayala,<br>Nuevo Leon |         | Vallecillo,<br>Nuevo Leon |         | Las Tortillas,<br>Tamaulipas |         | Rancho Bonanza,<br>Tamaulipas |         | Rancho San Rafael,<br>Bustamante, Tamps. |         |
|--------|----------------------------|---------|---------------------------|---------|------------------------------|---------|-------------------------------|---------|--|---------|
|        | 1981                       | Average | 1981                      | Average | 1981                         | Average | 1981                          | Average | 1981                                     | Average |
| Jan.   | 2.83                       | 0.49    | 2.95                      | 0.63    | 2.17                         | 0.63    | 3.58                          | 0.96    | 1.97                                     | 0.76    |
| Feb.   | .71                        | .50     | .87                       | .76     | .98                          | .96     | .79                           | .91     | .79                                      | 1.06    |
| Mar.   | .94                        | .59     | 1.22                      | .50     | 1.38                         | .55     | 1.69                          | .85     | 1.89                                     | .61     |
| Apr.   | 8.07                       | 2.06    | 7.40                      | 1.87    | 3.62                         | 1.40    | 5.20                          | 1.14    | 3.62                                     | 1.28    |
| May    | 3.46                       | 1.27    | 3.11                      | 2.05    | 10.75                        | 3.38    | 7.20                          | 3.33    | 8.78                                     | 3.02    |
| June   | 3.35                       | 2.08    | 3.07                      | 3.11    | 6.50                         | 3.33    | 6.10                          | 2.80    | 8.86                                     | 3.55    |
| July   | 1.97                       | 5.37    | 1.61                      | 1.83    | 0                            | 1.25    | 3.11                          | 2.97    | 1.38                                     | 1.86    |
| Aug.   | 3.39                       | 2.55    | 1.90                      | 2.44    | 2.24                         | 2.24    | 2.80                          | 2.21    | 1.18                                     | 2.89    |
| Sept.  | 1.73                       | 4.67    | 1.34                      | 4.29    | .28                          | 4.01    | .39                           | 3.46    | .39                                      | 4.23    |
| Oct.   |                            | 3.47    | 1.10                      | 2.07    | 2.09                         | 1.74    | 1.50                          | 1.87    | 2.05                                     | 2.92    |
| Nov.   | 0                          | 2.39    | 0                         | .92     | 0                            | 1.19    | 0                             | .90     | 0  | 1.26    |
| Dec.   | .08                        | .30     | 0                         | .65     | 0                            | .75     | 0                             | .84     | 0  | .62     |
| Yearly |                            | 25.74   |                           | 20.58   | 30.21                        | 21.43   | 32.36                         | 22.24   | 30.91                                    | 24.06   |

| Month  | Rio Salado Riberena,<br>Tamaulipas |         | Aniego 166,<br>Tamaulipas |         | La Bandera,<br>Tamaulipas |         | Nueva Cd. Guerrero,<br>Tamaulipas |         | La Escondida,<br>Nuevo Leon |         |
|--------|------------------------------------|---------|---------------------------|---------|---------------------------|---------|-----------------------------------|---------|-----------------------------|---------|
|        | 1981                               | Average | 1981                      | Average | 1981                      | Average | 1981                              | Average | 1981                        | Average |
| Jan.   | 1.57                               | 0.56    | 2.76                      | 0.81    | 2.83                      | 0.78    | 2.76                              | 0.92    | 2.87                        | 1.60    |
| Feb.   | .59                                | .83     | .98                       | .90     | .94                       | .79     | .98                               | .85     | 1.85                        | .66     |
| Mar.   | 1.02                               | .50     | 1.77                      | .56     | 1.69                      | .66     | 1.69                              | .55     | 1.38                        | .59     |
| Apr.   | 3.15                               | 1.26    | 2.83                      | 1.12    | 3.39                      | 1.40    | 2.76                              | 1.20    | 6.42                        | 3.21    |
| May    | 8.46                               | 2.84    | 8.82                      | 3.30    | 8.50                      | 3.14    | 7.05                              | 2.25    | 3.43                        | 1.63    |
| June   | 4.13                               | 2.49    | 5.83                      | 3.16    | 5.75                      | 3.59    | 4.49                              | 2.74    | 4.13                        | 2.85    |
| July   | 1.69                               | 1.57    | 1.02                      | 1.52    | .91                       | 1.87    | .71                               | 1.27    | 2.05                        | 1.13    |
| Aug.   | 2.05                               | 2.52    | 4.41                      | 2.48    | 3.27                      | 2.34    | 2.68                              | 2.16    | 6.57                        | 6.30    |
| Sept.  | .20                                | 4.75    | .79                       | 5.41    | .83                       | 5.16    | .94                               | 4.22    | .94                         | 2.20    |
| Oct.   | 1.18                               | 1.91    | 3.07                      | 2.05    | 2.48                      | 1.94    | 2.80                              | 2.09    | 1.69                        | 1.11    |
| Nov.   | 0                                  | 1.11    | 0                         | 1.08    | 0                         | 1.04    | T                                 | 1.01    | 0                           | .41     |
| Dec.   | 0                                  | .78     | .24                       | .70     | .24                       | .77     | .24                               | .66     | 0                           | 1.78    |
| Yearly | 24.04                              | 21.12   | 32.52                     | 23.09   | 30.83                     | 23.48   | 27.10                             | 19.92   | 31.33                       | 23.47   |

T Trace

## RAINFALL ON THE RIO GRANDE WATERSHED

## IN MEXICO

In Inches

| Month  | Hacienda El Alamo,<br>Nuevo Leon |         | Agualegas,<br>Nuevo Leon |         | General Trevino,<br>Nuevo Leon |         | Paras,<br>Nuevo Leon |         | San Javier,<br>Nuevo Leon |         |
|--------|----------------------------------|---------|--------------------------|---------|--------------------------------|---------|----------------------|---------|---------------------------|---------|
|        | 1981                             | Average | 1981                     | Average | 1981                           | Average | 1981                 | Average | 1981                      | Average |
| Jan.   | 3.07                             | 1.00    | 3.11                     | 1.30    | 3.19                           | 1.40    | 3.31                 | 0.61    | 2.68                      | 0.80    |
| Feb.   | 1.18                             | .83     | .40                      | .40     | 1.18                           | .67     | 1.22                 | .50     | .91                       | .92     |
| Mar.   | 1.10                             | .41     | 1.69                     | .98     | 1.65                           | .45     | 1.42                 | .62     | 1.54                      | .64     |
| Apr.   | 3.62                             | 1.20    | 5.75                     | 2.45    | 7.48                           | 1.99    | 3.46                 | .86     | 3.66                      | 1.63    |
| May    | 4.09                             | 2.07    | 7.56                     | 3.57    | 8.58                           | 4.40    | 7.20                 | 1.80    | 8.19                      | 3.62    |
| June   | 5.28                             | 3.78    | 4.41                     | 2.46    | 4.96                           | 2.18    | 9.96                 | 3.09    | 5.31                      | 3.60    |
| July   | 2.09                             | 2.52    | 2.01                     | 1.06    | 1.38                           | .83     | 1.06                 | 1.46    | 1.65                      | 2.17    |
| Aug.   | 1.38                             | 3.60    | .47                      | 2.52    | 3.27                           | 2.68    | 3.11                 | 2.31    | 3.78                      | 2.95    |
| Sept.  | 2.20                             | 5.21    | 1.06                     | 2.44    | 5.54                           | 2.05    | 3.82                 | .98     | 5.70                      |         |
| Oct.   | 3.39                             | 2.70    |                          | 2.09    | 1.57                           | 1.97    | 2.36                 | 2.13    | 2.26                      |         |
| Nov.   | .20                              | 1.07    |                          | 0       | 1.10                           | 0       | .79                  | 0       | 1.07                      |         |
| Dec.   | 0                                | .74     |                          | .20     | 1.04                           | .16     | .52                  | .24     | .78                       |         |
| Yearly | 27.60                            | 25.13   |                          | 36.42   | 23.85                          | 34.92   | 18.74                | 31.07   | 26.14                     |         |

| Month  | Cd. Mier, Km. 8 SW,<br>Tamaulipas |         | Cd. Mier,<br>Tamaulipas |         | Miguel Aleman,<br>Tamaulipas |         | Parras,<br>Coahuila |         | San Juan de Vaqueira,<br>Coahuila |         |
|--------|-----------------------------------|---------|-------------------------|---------|------------------------------|---------|---------------------|---------|-----------------------------------|---------|
|        | 1981                              | Average | 1981                    | Average | 1981                         | Average | 1981                | Average | 1981                              | Average |
| Jan.   | 2.76                              | 0.80    | 2.76                    | 0.97    | 1.93                         | 0.84    | 2.95                | 0.56    | 3.07                              |         |
| Feb.   | .87                               | .97     | .83                     | 1.06    | .47                          | .89     | .08                 | .37     | .57                               |         |
| Mar.   | 1.65                              | .67     | 1.65                    | .63     | 1.42                         | .39     | .31                 | .32     | .20                               |         |
| Apr.   | 3.74                              | 1.36    | 3.74                    | 1.35    | 3.94                         | 1.72    | 2.36                | .38     | 2.28                              | 1.26    |
| May    | 6.42                              | 2.97    | 5.87                    | 2.65    | 4.21                         | 2.05    | 2.64                | 1.10    | 2.80                              | 1.50    |
| June   | 5.43                              | 3.27    | 4.69                    | 2.47    | 11.34                        | 2.79    | 2.44                | 1.82    | 2.28                              | 1.40    |
| July   | 1.46                              | 1.83    | 1.38                    | 1.23    | 2.28                         | 1.94    | 1.50                | 2.55    | 3.11                              | 2.94    |
| Aug.   | 3.74                              | 2.72    | 3.86                    | 2.51    | 3.46                         | 2.13    | .20                 | 2.91    | .98                               | 1.59    |
| Sept.  | .51                               | 5.06    | .43                     | 4.76    | .83                          | 5.71    | 1.42                | 2.82    |                                   |         |
| Oct.   | 2.05                              | 2.43    | 2.17                    | 2.13    | 4.65                         | 1.86    | 4.17                | 1.36    | 2.13                              |         |
| Nov.   | 0                                 | 1.06    | 0                       | 1.11    | 0                            | .94     | 0                   | .58     | 0                                 | .18     |
| Dec.   | .20                               | .78     | .24                     | .76     | .16                          | .66     | .31                 | .75     | .08                               | .04     |
| Yearly | 28.83                             | 23.92   | 27.62                   | 21.63   | 34.69                        | 21.92   | 18.38               | 15.52   |                                   |         |

| Month  | General Cepeda,<br>Coahuila |         | Hipolito,<br>Coahuila |         | Reata,<br>Coahuila |         | Saltillo,<br>Coahuila |         | Ramos Arizpe,<br>Coahuila |         |
|--------|-----------------------------|---------|-----------------------|---------|--------------------|---------|-----------------------|---------|---------------------------|---------|
|        | 1981                        | Average | 1981                  | Average | 1981               | Average | 1981                  | Average | 1981                      | Average |
| Jan.   | 2.56                        | 0.49    | 1.14                  | 0.61    | 2.60               | 0.35    | 3.19                  | 0.59    | 1.57                      | 0.47    |
| Feb.   | 1.02                        | .48     | .94                   | .72     | .08                | .22     | .63                   | .55     | .59                       | .37     |
| Mar.   | .47                         | .28     | .94                   | .47     | .87                | .28     | .28                   | .40     | .51                       | .29     |
| Apr.   | 1.97                        | .42     | 2.05                  | 1.06    | 2.28               | .45     | .78                   | .98     | .47                       |         |
| May    | 2.17                        | .83     |                       |         | 2.20               | .82     | 3.07                  | 1.19    | 3.27                      | .88     |
| June   | 2.80                        | 2.14    |                       |         | .55                | 1.00    | 2.48                  | 2.17    | .83                       | 1.07    |
| July   | 1.73                        | 3.18    | 0                     | .51     | .12                | 1.07    | .39                   | 2.54    | .79                       | 1.35    |
| Aug.   | 1.30                        | 3.03    | .71                   | .71     | .71                | 1.53    | .43                   | 2.48    | 1.30                      | 1.33    |
| Sept.  | 2.76                        | 2.79    | 2.13                  | 1.32    | .57                | 1.57    | .75                   | 2.67    | .79                       | 1.73    |
| Oct.   | 1.81                        | 1.24    | 1.50                  | 1.32    | 1.42               | .75     | 1.85                  | 1.25    | 1.77                      | .76     |
| Nov.   | 0                           | .49     | 0                     | .30     | 0                  | .49     | T                     | .80     | 0                         | .48     |
| Dec.   | .12                         | .55     | 0                     | .04     | .38                | .08     | .64                   | 0       |                           | .51     |
| Yearly | 18.71                       | 15.92   |                       |         |                    | 8.91    |                       | 16.06   | 12.40                     | 9.71    |

| Month  | Huachichil,<br>Coahuila |         | Carbonera,<br>Nuevo Leon |         | Icamole,<br>Nuevo Leon |         | Mina,<br>Nuevo Leon |         | La Popa,<br>Nuevo Leon |         |
|--------|-------------------------|---------|--------------------------|---------|------------------------|---------|---------------------|---------|------------------------|---------|
|        | 1981                    | Average | 1981                     | Average | 1981                   | Average | 1981                | Average | 1981                   | Average |
| Jan.   | 5.28                    | 5.28    | 3.39                     | 0.85    | 1.89                   | 0.30    | 1.69                | 0.45    | 2.87                   | 0.48    |
| Feb.   | 1.26                    | 1.26    | .59                      | .64     | .51                    | .29     | .51                 | .40     | .28                    | .72     |
| Mar.   | .83                     | .83     | .87                      | .58     | .67                    | .15     | .71                 | .15     | .94                    | .25     |
| Apr.   | 3.39                    | 1.95    | 1.93                     | .92     | 2.60                   | .36     | 3.07                | .65     | 4.17                   | .61     |
| May    | 6.85                    | 4.06    | 5.87                     | 2.12    | 1.46                   | .75     | 1.46                | .62     | 1.50                   | .96     |
| June   | .35                     | 2.14    | 2.68                     | 2.34    | 1.10                   | 1.00    | 3.15                | 1.61    | 1.26                   | 1.65    |
| July   | 1.89                    | 2.06    | 1.02                     | 3.02    | .20                    | .95     | 3.07                | 1.69    | 2.91                   | 1.97    |
| Aug.   | 2.44                    | 2.17    | 3.90                     | 2.77    | 3.11                   | 2.19    | 1.81                | 3.14    | 2.99                   | 3.25    |
| Sept.  |                         |         |                          |         | 1.65                   | 2.87    | .99                 | 1.10    | 1.06                   | .75     |
| Oct.   | 0                       | .86     | 0                        | .88     | 0                      | .73     | T                   | .73     | 12.09                  | .70     |
| Nov.   | .04                     | .04     | .20                      | 1.01    | 0                      | .48     | .04                 | .48     |                        | .77     |
| Dec.   |                         |         |                          |         | 19.57                  | 14.76   | 8.77                | 17.63   |                        | 13.37   |
| Yearly |                         |         |                          |         |                        |         |                     |         |                        |         |

T Trace

## RAINFALL ON THE RIO GRANDE WATERSHED

IN MEXICO

In Inches

| Month  | La Arena,<br>Nuevo Leon |         | Cienega de Flores,<br>Nuevo Leon |         | Hacienda Mamulique,<br>Nuevo Leon |         | La Pomona,<br>Nuevo Leon |         | San Diego,<br>Nuevo Leon |         |
|--------|-------------------------|---------|----------------------------------|---------|-----------------------------------|---------|--------------------------|---------|--------------------------|---------|
|        | 1981                    | Average | 1981                             | Average | 1981                              | Average | 1981                     | Average | 1981                     | Average |
| Jan.   | 0.65                    | 3.15    | 1.28                             | 2.64    | 0.76                              | 4.17    | 2.12                     | 3.15    | .47                      | 0.33    |
| Feb.   | .94                     | .84     | .79                              | .91     | .33                               | .31     | .39                      | .39     | .79                      | .59     |
| Mar.   | 1.42                    | .64     | 1.38                             | 1.05    | 1.02                              | .33     | .47                      | .26     | 7.60                     | 3.71    |
| Apr.   | 5.71                    | 1.28    | 5.87                             | 1.57    | 4.61                              | 1.11    | 5.31                     | 2.37    | 7.95                     | 5.28    |
| May    | 4.80                    | 2.39    | 2.83                             | 2.57    | 2.52                              | 1.09    | 11.69                    | 5.81    | 16.54                    | 6.13    |
| June   | 5.91                    | 3.60    | 3.07                             | 3.33    | 2.72                              | 2.78    | 7.05                     | 4.10    |                          |         |
| July   | 1.10                    | 3.35    | 2.76                             | 2.33    | 1.61                              | 3.69    | 4.21                     | 2.39    |                          |         |
| Aug.   | 4.13                    | 3.99    | 5.39                             | 4.54    | 1.97                              | 3.04    | 3.11                     | 2.99    | 9.80                     | 5.61    |
| Sept.  | 5.63                    | 5.59    | 3.23                             | 5.95    | 2.36                              | 5.09    | 6.61                     | 4.97    | 2.95                     | 7.36    |
| Oct.   | .83                     | 2.68    | .47                              | 2.59    | 1.06                              | 1.16    | .83                      | 1.10    | .59                      | 2.33    |
| Nov.   | .08                     | .93     | T                                | 1.22    | 0                                 | 1.29    | 0                        | .95     | 0                        | .64     |
| Dec.   | 0                       | .44     | 0                                | 1.14    | 0                                 | .80     | .55                      | .38     |                          | 1.55    |
| Yearly |                         | 26.38   | 28.94                            | 28.54   | 21.42                             | 21.47   | 44.31                    | 27.83   |                          |         |

| Month  | Cola de Caballo,<br>Nuevo Leon |         | Una de Gato,<br>Nuevo Leon |         | Ejido Marin,<br>Nuevo Leon |         | La Huasteca,<br>Nuevo Leon |         | Vaqueria,<br>Nuevo Leon |         |
|--------|--------------------------------|---------|----------------------------|---------|----------------------------|---------|----------------------------|---------|-------------------------|---------|
|        | 1981                           | Average | 1981                       | Average | 1981                       | Average | 1981                       | Average | 1981                    | Average |
| Jan.   | 3.31                           | 1.48    | 2.24                       | 0.88    | 2.87                       | 1.58    | 1.42                       | 0.49    | 4.21                    | 2.18    |
| Feb.   | .91                            | .76     | 1.10                       | .69     | 1.26                       | 1.26    | .39                        | .33     | .47                     | .51     |
| Mar.   | .63                            | .74     | 1.69                       | .81     | 1.57                       | .80     | .35                        | .09     | 1.34                    | .88     |
| Apr.   | 6.06                           | 3.16    | 5.12                       | 1.92    | 4.69                       | 1.59    | 1.26                       | .55     | 1.97                    | 1.53    |
| May    | 4.25                           | 3.12    | 5.04                       | 2.59    | 3.07                       | 2.15    | 2.91                       | 1.35    | 2.95                    | 3.17    |
| June   | 13.15                          | 5.59    | 2.91                       | 1.92    | 3.86                       | 2.44    | 1.65                       | 2.13    | 8.07                    | 3.65    |
| July   | 2.91                           | 2.45    | 1.73                       | 1.53    | 1.97                       | 1.64    | 1.34                       | 1.00    | .94                     | 1.24    |
| Aug.   | 10.67                          | 7.40    | 4.13                       | 4.16    | 2.99                       | 3.50    | 2.87                       | 2.06    |                         |         |
| Sept.  | 11.50                          | 14.61   | 3.62                       | 3.31    | 7.09                       | 4.78    | 4.25                       | 4.66    | 3.66                    | 3.08    |
| Oct.   | 2.17                           | 5.38    | 1.34                       | .97     | .31                        | .72     | .87                        | 1.46    | 1.89                    | 2.00    |
| Nov.   | .04                            | .59     | .28                        | .51     | .08                        | .78     | 0                          | .22     |                         | 1.22    |
| Dec.   |                                | .57     | .16                        | 1.16    | T                          | 1.04    | 0                          | .64     |                         | 2.08    |
| Yearly |                                | 45.85   | 29.36                      | 20.45   | 29.76                      | 22.28   | 17.31                      | 14.98   |                         | 24.46   |

| Month  | Topo Chico,<br>Nuevo Leon |         | Tepehuaje,<br>Nuevo Leon |         | Gomez Farias,<br>Coahuila |         | Higueras,<br>Nuevo Leon |         | Los Ramones,<br>Nuevo Leon |         |
|--------|---------------------------|---------|--------------------------|---------|---------------------------|---------|-------------------------|---------|----------------------------|---------|
|        | 1981                      | Average | 1981                     | Average | 1981                      | Average | 1981                    | Average | 1981                       | Average |
| Jan.   | 3.23                      | 0.45    | 3.35                     | 1.95    | 3.50                      | 1.94    | 2.99                    | 0.69    | 3.31                       | 0.70    |
| Feb.   | 1.34                      | .55     | 1.06                     | .65     | .28                       | .71     | 1.18                    | .57     | 1.14                       | .74     |
| Mar.   | .98                       | .46     | .91                      | .50     | .39                       | .20     | 1.26                    | .64     | .98                        | .61     |
| Apr.   | 6.30                      | 1.06    | 5.16                     | 2.62    | 2.99                      | 1.77    | 5.59                    | 1.29    |                            | 1.48    |
| May    | 3.74                      | 1.44    | 6.81                     | 6.40    | 4.06                      | 2.11    | 3.23                    | 2.04    | 5.43                       | 2.66    |
| June   | 2.09                      | 2.39    | 5.67                     | 3.75    | 3.15                      | 2.32    | 1.97                    | 2.67    | 2.40                       | 3.23    |
| July   | 1.89                      | 1.51    | 3.15                     | 2.37    | .79                       | 1.31    | 1.18                    | 2.24    | .94                        | 1.89    |
| Aug.   | 2.48                      | 3.21    | 6.38                     | 3.72    | 3.94                      | 2.26    | 5.35                    | 3.44    | 4.80                       | 3.53    |
| Sept.  | 5.12                      | 4.77    | 2.72                     | 4.41    | .83                       | 1.14    | 3.66                    | 4.85    | 5.12                       | 5.64    |
| Oct.   | 1.10                      | 2.63    | .39                      | 1.14    | 1.46                      | 1.47    | 1.42                    | 1.85    | .47                        | 2.76    |
| Nov.   | .12                       | .76     | .47                      | .84     | 0                         | .28     | 0                       | .82     | .04                        | .73     |
| Dec.   | 0                         | .46     | .04                      | .24     | 1.23                      | .04     | .68                     | T       |                            | .51     |
| Yearly | 28.39                     | 19.69   | 36.11                    | 28.39   | 21.63                     | 16.74   | 27.87                   | 21.78   |                            | 24.48   |

| Month  | Cerro Prieto,<br>Nuevo Leon |         | Los Herrera,<br>(La Tableta), N. L. |         | Madero (Los Aldamas),<br>Nuevo Leon |         | El Brasil,<br>Nuevo Leon |         | Rincónada,<br>Nuevo Leon |         |
|--------|-----------------------------|---------|-------------------------------------|---------|-------------------------------------|---------|--------------------------|---------|--------------------------|---------|
|        | 1981                        | Average | 1981                                | Average | 1981                                | Average | 1981                     | Average | 1981                     | Average |
| Jan.   | 4.21                        | 0.64    | 3.19                                | 0.62    | 2.80                                | 0.98    | 2.87                     | 1.44    | 2.09                     | 0.33    |
| Feb.   | 0                           | .56     | .94                                 | .64     | .63                                 | .80     | .63                      | .53     | .39                      | .28     |
| Mar.   | .79                         | .47     | 1.02                                | .62     | 1.89                                | .83     | 1.26                     | .63     | .79                      | .21     |
| Apr.   | 3.82                        | 1.26    | 5.04                                | 1.33    | 3.70                                | 1.05    | 3.11                     | 3.11    | 2.91                     | .46     |
| May    | 11.42                       | 4.87    | 6.22                                | 2.77    | 5.98                                | 3.26    | 2.13                     | 2.78    | 3.35                     | .58     |
| June   | 7.40                        | 3.89    | 2.76                                | 2.64    | 2.72                                | 3.99    | 4.57                     | 2.28    | 1.69                     | 1.13    |
| July   | 2.42                        | 2.60    | 1.89                                | 2.17    | 2.27                                | 2.80    | 1.55                     | .20     | .56                      |         |
| Aug.   | 4.80                        | 3.27    | 2.87                                | 2.71    | 4.65                                | 4.73    | 3.74                     | 2.82    | 1.61                     | 1.23    |
| Sept.  | 3.70                        | 5.12    | .75                                 | 4.93    |                                     | 6.04    | 2.36                     | 2.41    | 1.85                     | 1.88    |
| Oct.   | 1.77                        | 2.76    | .83                                 | 2.33    | .67                                 | 1.92    | 1.06                     | .87     | 1.06                     | .86     |
| Nov.   |                             | .65     | 0                                   | .67     | 0                                   | .51     | 0                        | .70     | 0                        | .39     |
| Dec.   | .79                         | .73     | .08                                 | .50     |                                     | .75     | 0                        | .93     | .08                      | .35     |
| Yearly |                             | 26.64   | 26.30                               | 21.65   |                                     | 27.13   | 24.53                    | 20.05   | 16.02                    | 8.26    |

T Trace

## RAINFALL ON THE RIO GRANDE WATERSHED

## IN MEXICO

In Inches

| Month  | Santa Catarina,<br>Nuevo Leon |         | Monterrey,<br>Nuevo Leon |         | Apodaca,<br>Nuevo Leon |         | Pajonal,<br>Nuevo Leon |         | La Cruz,<br>Nuevo Leon |         |
|--------|-------------------------------|---------|--------------------------|---------|------------------------|---------|------------------------|---------|------------------------|---------|
|        | 1981                          | Average | 1981                     | Average | 1981                   | Average | 1981                   | Average | 1981                   | Average |
| Jan.   | 2.76                          | 0.67    | 1.73                     | 0.61    | 2.72                   | 0.66    | 1.73                   | 0.55    | 5.08                   | 0.89    |
| Feb.   | .55                           | .42     | 3.11                     | .70     | 1.18                   | .80     | .55                    | .60     | 1.02                   | .53     |
| Mar.   | 1.26                          | .33     | 1.85                     | .71     | 1.22                   | .64     | .75                    | .25     | 2.32                   | .38     |
| Apr.   | 5.83                          | .71     | 3.27                     | 1.12    | 5.71                   | 1.25    | 4.49                   | .97     | 5.00                   | 1.03    |
| May    | 2.72                          | .96     | 3.82                     | 1.60    | 3.90                   | 2.04    | 7.17                   | 2.01    | 3.35                   | 1.63    |
| June   | 1.89                          | 2.01    | 3.90                     | 2.83    | 3.43                   | 2.97    | 4.06                   | 2.57    | 2.56                   | 2.56    |
| July   | .94                           | 1.21    | 2.87                     | 2.44    | 1.57                   | 2.29    | 3.58                   | 2.56    | 1.10                   | 3.04    |
| Aug.   | 2.60                          | 2.74    | 3.50                     | 3.30    | 2.83                   | 3.41    | 3.86                   | 3.95    | 3.19                   | 3.94    |
| Sept.  | 5.63                          | 4.33    | 4.65                     | 6.02    | 3.03                   | 5.75    | 6.69                   | 5.01    | .71                    | 6.21    |
| Oct.   | .67                           | 1.66    | .43                      | 1.20    | .67                    | 2.14    | 1.77                   | 2.09    | .75                    | 2.14    |
| Nov.   | .08                           | .55     | .12                      | 0       | .24                    | .90     | .16                    | .52     | 0                      | .78     |
| Dec.   | 0                             | .50     | 0                        | .68     | 0                      | .64     |                        | .63     | 0                      | .33     |
| Yearly | 24.93                         | 16.09   | 29.25                    | 24.38   | 26.50                  | 23.49   |                        | 21.71   |                        | 23.46   |

| Month  | Tunel San Francisco,<br>Nuevo Leon |         | Las Comitas,<br>Nuevo Leon |         | Presas La Boca,<br>Nuevo Leon |         | Las Enramadas,<br>Nuevo Leon |         | Adjuntas,<br>Nuevo Leon |         |
|--------|------------------------------------|---------|----------------------------|---------|-------------------------------|---------|------------------------------|---------|-------------------------|---------|
|        | 1981                               | Average | 1981                       | Average | 1981                          | Average | 1981                         | Average | 1981                    | Average |
| Jan.   | 6.14                               | 1.14    | 1.65                       | 0.34    | 2.99                          | 0.90    | 3.31                         | 0.87    | 3.11                    | 0.67    |
| Feb.   |                                    | 1.16    | 1.26                       | .39     | .91                           | .97     | .71                          | .69     | .67                     | .55     |
| Mar.   | 1.65                               | 1.46    | T                          | .23     | .79                           | 1.09    | .51                          | .71     |                         | .42     |
| Apr.   | 7.40                               | 2.30    |                            | .69     | 6.54                          | 1.78    | 3.03                         | 1.83    | 1.81                    | 1.38    |
| May    | 5.91                               | 3.22    | 2.95                       | 1.04    | 4.69                          | 2.66    | 6.10                         | 2.94    | 3.50                    | 2.92    |
| June   | 7.91                               | 6.79    | 2.91                       | 2.46    | 13.07                         | 5.78    | 2.87                         | 3.31    | 7.09                    | 7.78    |
| July   |                                    | 4.19    |                            | 1.82    | 1.81                          | 3.74    | 2.09                         | 2.32    | 1.81                    | 5.43    |
| Aug.   | 8.35                               | 7.47    | 2.36                       | 3.32    | 4.25                          | 6.40    | 9.02                         | 3.83    | 10.08                   | 5.87    |
| Sept.  | 7.40                               | 11.17   | 5.87                       | 4.76    | 7.68                          | 9.58    | 1.81                         | 6.45    | 6.42                    | 11.92   |
| Oct.   |                                    | 6.05    | .39                        | 1.81    | 1.22                          | 4.96    | .35                          | 2.62    | 2.56                    | 4.55    |
| Nov.   | .28                                | 1.86    | .31                        | .52     | .04                           | 1.37    | 0                            | .78     | 0                       | .80     |
| Dec.   | .31                                | .88     | 0                          | .40     | .04                           | .89     | 0                            | .73     | T                       | .42     |
| Yearly |                                    | 47.68   |                            | 17.78   | 44.03                         | 40.12   | 29.80                        | 27.08   |                         | 42.71   |

| Month  | Villa Allende,<br>Nuevo Leon |         | San Juan,<br>Nuevo Leon |         | Laguna de Sanchez,<br>Nuevo Leon |         | Cerritos,<br>Nuevo Leon |         | Casillas,<br>Nuevo Leon |         |
|--------|------------------------------|---------|-------------------------|---------|----------------------------------|---------|-------------------------|---------|-------------------------|---------|
|        | 1981                         | Average | 1981                    | Average | 1981                             | Average | 1981                    | Average | 1981                    | Average |
| Jan.   | 4.69                         | 1.04    | 4.02                    | 0.61    | 0.28                             | 0.61    | 4.41                    | 0.79    | 3.66                    | 0.64    |
| Feb.   | 1.02                         | 1.25    | 1.69                    | .92     | 1.38                             | .64     | 1.34                    | .92     |                         | .66     |
| Mar.   | 1.34                         | 1.27    | .98                     | .69     | .08                              | .41     | 1.26                    | .54     | .28                     | .56     |
| Apr.   | 7.72                         | 2.63    | 10.67                   | 2.17    | 1.38                             | 1.21    | 9.61                    | 1.58    |                         | .96     |
| May    | 8.78                         | 3.72    | 6.22                    | 2.65    | 1.30                             | 1.81    | 1.26                    | 3.23    | 6.34                    | 3.42    |
| June   | 12.24                        | 5.42    | 7.32                    | 3.27    | 5.63                             | 3.53    | 7.01                    | 5.79    |                         | 3.42    |
| July   | 2.24                         | 3.59    | 2.72                    | 2.27    | .63                              | 2.55    | 6.31                    | 2.68    |                         | 2.52    |
| Aug.   | 7.52                         | 5.69    | 6.65                    | 3.68    | 3.62                             | 4.13    | 5.28                    | 6.01    |                         | 2.99    |
| Sept.  | 6.38                         | 9.02    | 5.20                    | 5.59    | 5.91                             | 6.51    | 10.08                   | 12.00   | 3.27                    | 4.62    |
| Oct.   | 2.44                         | 5.32    | 1.42                    | 3.16    |                                  | 2.69    | 1.02                    | 3.99    | .79                     | 2.39    |
| Nov.   | .04                          | 1.63    | .55                     | 1.01    |                                  | .67     | 1.50                    | .70     | .20                     | .70     |
| Dec.   | .04                          | .99     | .12                     | .63     |                                  | .56     | 0                       | .49     | 0                       | .49     |
| Yearly | 54.45                        | 41.57   | 47.56                   | 26.65   |                                  | 25.62   |                         | 43.57   |                         | 22.07   |

| Month  | Cienega del Toro,<br>Nuevo Leon |         | Mimbres,<br>Nuevo Leon |         | Rusio,<br>Nuevo Leon |         | Rayones,<br>Nuevo Leon |         | Potosi,<br>Nuevo Leon |         |
|--------|---------------------------------|---------|------------------------|---------|----------------------|---------|------------------------|---------|-----------------------|---------|
|        | 1981                            | Average | 1981                   | Average | 1981                 | Average | 1981                   | Average | 1981                  | Average |
| Jan.   | 4.65                            | 1.06    | 2.52                   | 1.31    | 2.44                 | 0.74    | 2.95                   | 0.38    | 2.87                  | 0.93    |
| Feb.   | .98                             | .59     | .79                    | 1.22    | .12                  | .59     | .39                    | .40     | .75                   | .68     |
| Mar.   | 1.18                            | .79     | 1.85                   | 1.14    | 2.76                 | .58     | .79                    | .32     | .39                   | .36     |
| Apr.   | 2.24                            | 1.43    | 3.15                   | 1.62    | .79                  | 1.10    | 2.40                   | 1.05    | 1.38                  | 1.27    |
| May    |                                 | 2.47    | 6.77                   | 2.53    |                      | 1.76    | 5.43                   | 1.84    | 3.11                  | 1.64    |
| June   |                                 | 2.23    | 6.77                   | 3.03    |                      | .98     | 1.82                   | 4.45    | 2.12                  | .98     |
| July   |                                 | 2.99    | 3.46                   | 2.97    |                      | 2.26    | 1.16                   | 1.06    | 1.17                  | 1.36    |
| Aug.   |                                 | 3.01    | 3.78                   | 3.51    |                      | 2.17    | 1.45                   | 3.94    | 2.82                  | 1.41    |
| Sept.  |                                 | 3.55    | 2.87                   | 3.91    |                      | .20     | 1.68                   | 3.98    | .47                   | 1.54    |
| Oct.   |                                 | 2.17    | 2.17                   | 2.09    |                      | .71     | 1.20                   | .59     | 1.54                  | 1.36    |
| Nov.   | .12                             | .88     | .51                    | 1.21    | 0                    | .67     | .28                    | .45     | .79                   | 1.22    |
| Dec.   | .08                             | .78     | 0                      | 1.08    | .04                  | .83     | .12                    | .38     | 0                     | 1.51    |
| Yearly |                                 | 21.95   | 34.64                  | 25.62   |                      | 13.58   | 26.38                  | 15.88   | 12.28                 | 14.55   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO**  
**In Inches**

| Month  | Galeana,<br>Nuevo Leon |         | Iturbide,<br>Nuevo Leon |         | Cabezones,<br>Nuevo Leon |         | Linares,<br>Nuevo Leon |         | Montemorelos,<br>Nuevo Leon |         |
|--------|------------------------|---------|-------------------------|---------|--------------------------|---------|------------------------|---------|-----------------------------|---------|
|        | 1981                   | Average | 1981                    | Average | 1981                     | Average | 1981                   | Average | 1981                        | Average |
| Jan.   | 3.62                   | 0.38    | 1.89                    | 0.57    | 4.09                     | 0.91    | 3.94                   | 0.91    | 4.13                        | 0.82    |
| Feb.   | .31                    | .51     | .35                     | .64     | .47                      | .83     | .39                    | .84     | .71                         | .96     |
| Mar.   | .94                    | .37     | 1.26                    | .60     | 1.10                     | 1.13    | .94                    | 1.04    | .87                         | 1.13    |
| Apr.   | 1.46                   | 1.15    | .16                     | 1.17    | 5.20                     | 2.50    | 5.55                   | 2.28    | 7.52                        | 2.27    |
| May    | 6.34                   | 1.82    | 5.08                    | 2.02    | 4.65                     | 3.70    | 7.20                   | 3.69    | 5.51                        | 3.28    |
| June   | 3.07                   | 1.82    | 7.32                    | 3.56    | 6.10                     | 4.46    | 13.11                  | 3.95    | 7.09                        | 4.11    |
| July   | .71                    | 1.68    | 2.44                    | 2.66    | 1.65                     | 3.12    | .71                    | 2.65    | 2.32                        | 2.23    |
| Aug.   | 3.11                   | 2.50    | 6.77                    | 4.25    | 7.83                     | 5.56    | 7.40                   | 3.82    | 3.31                        | 4.28    |
| Sept.  | 3.39                   | 3.08    | 8.07                    | 6.02    | 8.03                     | 8.93    | 3.66                   | 6.47    | 7.32                        | 6.41    |
| Oct.   | 1.35                   | 1.10    | 2.43                    | 2.13    | 3.54                     | 2.28    | 3.45                   | 1.26    | 2.01                        | 3.92    |
| Nov.   | .32                    | 0       | .55                     | .39     | 1.01                     | .24     | 1.14                   | 2.01    | 1.58                        |         |
| Dec.   | .08                    | .63     | .24                     | .59     | .35                      | .83     | 1.05                   | .31     | .89                         |         |
| Yearly |                        | 15.61   | 34.68                   | 25.06   | 41.99                    | 36.52   |                        | 31.29   | 42.36                       | 31.88   |

| Month  | Gral. Teran (Experiment Station), Nuevo Leon |      |         | El Realito, Nuevo Leon |         |       | San Rafael, Nuevo Leon |         | El Cuchillo, Nuevo Leon |         |      |
|--------|--|------|---------|------------------------|---------|-------|------------------------|---------|-------------------------|---------|------|
|        | 1980   | 1981 | Average | 1981                   | Average | 1981  | 1981                   | Average | 1981                    | Average |      |
| Jan.   |  | 4.45 | 0.80    |                        |         | 3.62  | 0.80                   | 2.99    | 0.88                    | 3.15    | 0.67 |
| Feb.   |  | .79  | .85     |                        |         | .35   | .48                    | .79     | .89                     | .63     | .54  |
| Mar.   |  | .75  | 1.29    |                        |         | .75   | .59                    | .63     | .59                     | .75     | .48  |
| Apr.   |  | 5.47 | 1.60    |                        |         | 2.95  | 1.29                   |         |                         | 6.38    | 1.37 |
| May    |  | 5.35 | 3.08    |                        |         | 8.23  | 2.72                   |         |                         | 4.02    | 2.32 |
| June   |  |      | 4.44    |                        |         | 4.92  | 2.78                   | 2.05    | 2.24                    | 5.55    | 2.61 |
| July   |  | 5.59 | 6.77    | 4.03                   |         | 7.80  | 4.21                   | 4.25    | 2.56                    | 5.20    | 2.88 |
| Aug.   |  | .59  | 7.31    | 5.28                   |         | 5.28  | 6.56                   | .98     | 2.20                    | 4.17    | 4.59 |
| Sept.  |  | 3.11 | 4.05    |                        |         | 1.95  | 0                      | .39     | 1.75                    | .31     | 1.99 |
| Oct.   |  | .71  | .20     | 1.09                   |         | .54   |                        | .90     | 0                       | .57     |      |
| Nov.   |  | .55  | 0       | .59                    |         | .62   |                        | .88     | T                       | .50     |      |
| Yearly |  |      | 31.84   |                        |         | 25.24 |                        | 17.92   | 32.21                   | 20.46   |      |

| Month  | General Bravo, Nuevo Leon |         | Cerralvo, Nuevo Leon |         | El Cuervito, Nuevo Leon |         | Comales, Tamaulipas |         | Camargo, Tamaulipas |         |
|--------|---------------------------|---------|----------------------|---------|-------------------------|---------|---------------------|---------|---------------------|---------|
|        | 1981                      | Average | 1981                 | Average | 1981                    | Average | 1981                | Average | 1981                | Average |
| Jan.   | 3.23                      | 0.78    | 2.56                 | 0.69    | 4.69                    | 2.42    | 2.60                | 0.87    | 2.20                | 0.97    |
| Feb.   |                           | .54     | 1.02                 | .61     | .51                     | .71     | .47                 | .71     | .59                 | .86     |
| Mar.   |                           | .54     | 2.28                 | .55     | 1.77                    | 1.77    | 1.57                | .63     | 1.85                | .54     |
| Apr.   | 5.51                      | 1.48    | 1.77                 | 1.75    | 2.68                    | 2.68    | 3.66                | 1.59    | 2.91                | 1.61    |
| May    | 3.94                      | 2.89    | 7.05                 | 3.11    | 5.08                    | 3.92    | 4.41                | 2.05    | 4.80                | 2.28    |
| June   | .28                       | 2.61    | 4.02                 | 3.23    | 4.41                    | 4.41    | 4.45                | 2.14    | 9.13                | 2.47    |
| July   |                           | 2.25    | 2.99                 | 1.87    |                         |         | 1.34                | 1.38    | .79                 | 1.38    |
| Aug.   | 5.98                      | 2.73    | 3.19                 | 3.44    |                         |         | 5.35                | 2.72    | 6.14                | 2.31    |
| Sept.  | 1.54                      | 4.42    | 2.36                 | 5.23    | 1.26                    |         | .59                 | 4.15    | 2.52                | 4.75    |
| Oct.   | .47                       | 2.04    | 2.32                 | 2.63    |                         |         | 2.20                | 2.28    | 2.17                | 1.94    |
| Nov.   | 0                         | .86     | .08                  | .72     | T                       |         | 0                   | .74     | .59                 | 1.05    |
| Dec.   | .04                       | .73     | .12                  | .49     | T                       |         | .16                 | .73     | .16                 | .68     |
| Yearly |                           | 21.87   | 29.76                | 24.32   |                         |         | 26.80               | 19.99   | 33.85               | 20.84   |

| Month  | Valadeces, Tamaulipas |         | Bajo Rio San Juan, Tamps., No. 2-29 |         | Cd. Diaz Ordaz, Tamaulipas |         | Reynosa Km. 22 SW, Tamaulipas |         | Bajo Rio San Juan, Tamps., No. 2-38 |         |
|--------|-----------------------|---------|-------------------------------------|---------|----------------------------|---------|-------------------------------|---------|-------------------------------------|---------|
|        | 1981                  | Average | 1981                                | Average | 1981                       | Average | 1981                          | Average | 1981                                | Average |
| Jan.   | 2.76                  | 1.19    | 2.40                                | 1.29    | 4.29                       | 1.06    | 3.54                          | 1.24    | 2.83                                | 1.30    |
| Feb.   | .35                   | .83     | .75                                 | .85     | 1.69                       | .90     | .79                           | .75     | .47                                 | .78     |
| Mar.   | 2.52                  | .60     | 3.07                                | .53     | 3.90                       | .60     | 3.15                          | .69     | 2.60                                | .53     |
| Apr.   | 2.20                  | 1.53    | 2.80                                | 1.52    | 3.78                       | 1.53    | 1.97                          | 1.60    | 2.20                                | 1.40    |
| May    | 3.46                  | 2.61    | 3.54                                | 3.18    | 3.39                       | 2.36    | 5.51                          | 2.73    | 5.20                                | 3.21    |
| June   | 5.59                  | 3.08    | 5.16                                | 2.82    | 6.61                       | 2.44    | 8.46                          | 2.98    | 7.28                                | 3.32    |
| July   | 1.02                  | 1.56    | 2.05                                | 1.49    | 2.01                       | 1.30    | 2.76                          | 2.03    | 1.10                                | 1.83    |
| Aug.   | 3.82                  | 2.61    | 1.77                                | 2.83    | 5.12                       | 2.38    | 1.18                          | 2.68    | 2.83                                | 3.79    |
| Sept.  | 1.26                  | 4.69    | 1.81                                | 4.29    | 1.73                       | 3.89    | 1.57                          | 4.15    | 1.14                                | 4.01    |
| Oct.   | 2.05                  | 2.32    | 1.81                                | 2.44    | 4.33                       | 2.61    | 2.56                          | 2.07    | 1.89                                | 1.86    |
| Nov.   | 0                     | 1.09    | 0                                   | .91     | 0                          | .97     | 0                             | 1.11    | 0                                   | 1.09    |
| Dec.   | .08                   | .80     | .12                                 | .89     | .75                        | .87     | .39                           | 1.10    | .08                                 | .91     |
| Yearly | 25.11                 | 22.91   | 25.28                               | 23.04   | 37.60                      | 20.91   | 31.88                         | 23.13   | 27.62                               | 24.03   |

T Trace

**RAINFALL ON THE RIO GRANDE WATERSHED**  
**IN MEXICO**  
**In Inches**

| Month         | Bajo Rio San Juan,<br>Tamps., No. 2-33 |              | Arguelles,<br>Tamaulipas |              | Presa Anzalduas,<br>Tamaulipas |              | Reynosa,<br>Tamaulipas |              | Bajo Rio San Juan,<br>Tamps., No. 3-55 |              |
|---------------|--|--------------|--------------------------|--------------|--------------------------------|--------------|------------------------|--------------|--|--------------|
|               | 1981                                   | Average      | 1981                     | Average      | 1981                           | Average      | 1981                   | Average      | 1981                                   | Average      |
| Jan.          | 2.80                                   | 1.33         | 3.15                     | 1.25         | 2.20                           | 0.88         | 3.43                   | 1.12         | 2.99                                   | 1.70         |
| Feb.          | .71                                    | .83          | 1.18                     | 1.04         | .43                            | .53          | .71                    | .87          | .87                                    | 1.21         |
| Mar.          | 2.83                                   | .55          | 2.36                     | .57          | 2.36                           | .57          | 3.15                   | .72          | 3.62                                   | .75          |
| Apr.          | 2.20                                   | 1.73         | 2.36                     | 1.60         | 2.28                           | 1.58         | 1.34                   | 1.27         | 2.60                                   | 2.17         |
| May           | 9.06                                   | 3.63         | 11.02                    | 2.94         | 6.93                           | 2.56         | 8.54                   | 2.38         | 7.91                                   | 2.53         |
| June          | 6.93                                   | 3.02         | 7.68                     | 2.65         | 5.35                           | 2.42         | 5.39                   | 2.28         | 2.13                                   | 3.33         |
| July          | 2.09                                   | 1.94         | 2.36                     | 1.61         | 3.39                           | 1.57         | 8.03                   | 1.61         | 1.34                                   | 2.86         |
| Aug.          | 2.72                                   | 3.36         | 3.35                     | 2.40         | 2.40                           | 2.63         | 2.72                   | 2.04         | 1.89                                   | 3.07         |
| Sept.         | 1.22                                   | 4.41         | 1.57                     | 3.90         | 1.18                           | 3.67         | .71                    | 3.66         | 1.73                                   | 4.57         |
| Oct.          | 2.48                                   | 2.36         | 2.76                     | 1.81         | 3.94                           | 2.39         | 3.39                   | 2.30         | 2.68                                   | 3.00         |
| Nov.          | 0                                      | 1.00         | 0                        | 1.05         | 0                              | .66          | 0                      | .92          | 0                                      | .92          |
| Dec.          | .04                                    | 1.02         | 0                        | 1.02         | .08                            | .64          | .31                    | .81          | .16                                    | .92          |
| <b>Yearly</b> | <b>33.08</b>                           | <b>25.18</b> | <b>37.79</b>             | <b>21.84</b> | <b>30.54</b>                   | <b>20.10</b> | <b>37.72</b>           | <b>19.98</b> | <b>27.92</b>                           | <b>27.03</b> |

| Month         | Bajo Rio San Juan,<br>Tamps., No. 3-58 |              | Bajo Rio San Juan,<br>Tamps., No. 3-60 |              | Bajo Rio San Juan,<br>Tamps., No. 3-47 |              | Bajo Rio San Juan,<br>Tamps., No. 3-63 |              | Rio Bravo,<br>Tamaulipas |              |
|---------------|--|--------------|--|--------------|--|--------------|--|--------------|--------------------------|--------------|
|               | 1981                                   | Average      | 1981                                   | Average      | 1981                                   | Average      | 1981                                   | Average      | 1981                     | Average      |
| Jan.          | 2.76                                   | 1.49         | 2.28                                   | 1.35         | 3.19                                   | 1.80         | 3.03                                   | 1.52         | 2.80                     | 1.30         |
| Feb.          | .55                                    | 1.05         | .67                                    | 1.08         | .87                                    | 1.06         | .75                                    | 1.20         | .39                      | 1.13         |
| Mar.          | 3.15                                   | .70          | 3.19                                   | .69          | 3.07                                   | .64          | 1.22                                   | .61          | 3.07                     | .69          |
| Apr.          | 1.77                                   | 1.72         | 2.13                                   | 1.71         | .55                                    | 1.70         | .39                                    | 1.40         | .16                      | 1.65         |
| May           | 9.96                                   | 2.66         | 6.22                                   | 2.35         | 7.87                                   | 3.14         | 4.41                                   | 2.36         | 5.87                     | 2.35         |
| June          | 2.64                                   | 2.99         | 3.31                                   | 3.41         | 3.07                                   | 3.46         | 4.37                                   | 3.76         | 2.91                     | 2.83         |
| July          | 2.36                                   | 2.98         | 1.61                                   | 2.21         | 5.08                                   | 2.78         | .98                                    | 2.28         | 3.43                     | 2.28         |
| Aug.          | 2.52                                   | 2.99         | 3.19                                   | 2.80         | 1.81                                   | 2.93         | 3.90                                   | 3.14         | 2.72                     | 2.91         |
| Sept.         | 1.02                                   | 4.90         | 2.09                                   | 4.63         | 0                                      | 4.60         | 1.77                                   | 5.01         | 1.93                     | 4.97         |
| Oct.          | 2.48                                   | 2.81         | 2.44                                   | 2.88         | 1.73                                   | 2.43         | 3.46                                   | 2.49         | 1.50                     | 2.69         |
| Nov.          | 0                                      | 1.06         | 0                                      | 1.08         | 0                                      | .96          | 0                                      | .89          | 0                        | 1.19         |
| Dec.          | .24                                    | .89          | .79                                    | .87          | 0                                      | 1.06         | 1.81                                   | .89          | .20                      | .89          |
| <b>Yearly</b> | <b>29.45</b>                           | <b>26.24</b> | <b>27.92</b>                           | <b>25.06</b> | <b>27.24</b>                           | <b>26.56</b> | <b>26.09</b>                           | <b>25.55</b> | <b>24.98</b>             | <b>24.88</b> |

| Month         | Retamal,<br>Tamaulipas |              | Bajo Rio Bravo,<br>Tamps., No. 3-15 |              | Bajo Rio Bravo,<br>Tamps., No. 4-16 |              | Bajo Rio Bravo,<br>Tamps., No. 3-14 |              | Bajo Rio Bravo,<br>Tamps., No. 3-17 |              |
|---------------|------------------------|--------------|-------------------------------------|--------------|-------------------------------------|--------------|-------------------------------------|--------------|-------------------------------------|--------------|
|               | 1981                   | Average      | 1981                                | Average      | 1981                                | Average      | 1981                                | Average      | 1981                                | Average      |
| Jan.          | 3.50                   | 1.01         | 2.60                                | 1.66         | 3.15                                | 1.39         | 2.99                                | 1.38         | 3.39                                | 1.59         |
| Feb.          | 1.02                   | .92          | .98                                 | 1.37         | 1.26                                | 1.12         | 1.18                                | .98          | 1.81                                | 1.25         |
| Mar.          | 1.85                   | .69          | 2.28                                | .83          | 2.60                                | .76          | 2.80                                | .60          | 2.32                                | .70          |
| Apr.          | 2.76                   | 1.54         | .98                                 | 2.24         | 1.10                                | 2.06         | 1.30                                | 1.56         | 1.89                                | 1.60         |
| May           | 8.43                   | 2.49         | 4.80                                | 2.57         | 5.71                                | 2.65         | 4.49                                | 2.62         | 4.21                                | 2.52         |
| June          | .43                    | 2.63         | 4.25                                | 4.06         | 5.16                                | 4.32         | 2.13                                | 2.98         | 5.16                                | 3.28         |
| July          | 2.13                   | 1.59         | 2.40                                | 2.80         | 2.91                                | 2.31         | 2.87                                | 2.48         | 1.81                                | 2.60         |
| Aug.          | 4.45                   | 2.83         | 3.46                                | 3.59         | 4.49                                | 4.01         | 2.52                                | 2.93         | 3.07                                | 3.67         |
| Sept.         | 1.46                   | 3.47         | 1.10                                | 4.45         | 2.95                                | 5.06         | 1.73                                | 3.97         | 2.68                                | 4.80         |
| Oct.          | 3.54                   | 2.61         | 3.66                                | 2.86         | 5.98                                | 2.71         | 4.02                                | 2.56         | 2.17                                | 2.56         |
| Nov.          | 0                      | 1.19         | 0                                   | 1.32         | 0                                   | 1.48         | 0                                   | .95          | 0                                   | 1.28         |
| Dec.          | .16                    | .98          | .08                                 | 1.28         | .20                                 | .97          | .08                                 | 1.00         | 1.34                                | 1.18         |
| <b>Yearly</b> | <b>29.73</b>           | <b>21.95</b> | <b>26.59</b>                        | <b>29.03</b> | <b>35.51</b>                        | <b>28.84</b> | <b>26.11</b>                        | <b>24.01</b> | <b>29.85</b>                        | <b>27.03</b> |

| Month         | Bajo Rio Bravo,<br>Tamps., No. 4-8 |              | Bajo Rio Bravo,<br>Tamps., No. 2-6 |              | Bajo Rio Bravo,<br>Tamps., No. 4-10 |              | Valle Hermoso,<br>Tamaulipas |              | Control,<br>Tamaulipas |              |
|---------------|------------------------------------|--------------|------------------------------------|--------------|-------------------------------------|--------------|------------------------------|--------------|------------------------|--------------|
|               | 1981                               | Average      | 1981                               | Average      | 1981                                | Average      | 1981                         | Average      | 1981                   | Average      |
| Jan.          | 2.95                               | 1.54         | 2.83                               | 1.98         | 3.54                                | 1.45         | 2.68                         | 1.14         | 3.27                   | 1.31         |
| Feb.          | 1.77                               | 1.28         | 1.69                               | 1.36         | 2.13                                | 1.63         | 1.89                         | 1.23         | .63                    | 1.05         |
| Mar.          | 2.99                               | .93          | 2.28                               | .86          | 2.32                                | 1.09         | 2.36                         | .73          | 3.07                   | .66          |
| Apr.          | .20                                | 2.36         | .87                                | 1.79         | .08                                 | 2.15         | 0                            | 1.97         | 1.02                   | 1.66         |
| May           | 2.32                               | 3.04         | 3.15                               | 2.64         | 3.94                                | 2.44         | 2.95                         | 3.28         | 2.80                   | 2.98         |
| June          | 3.03                               | 3.08         | 1.69                               | 2.93         | 4.02                                | 3.16         | 2.95                         | 2.06         | 4.09                   | 1.80         |
| July          | 2.52                               | 3.01         | 1.50                               | 2.65         | 1.81                                | 2.65         | 2.36                         | 2.06         | 6.14                   | 3.42         |
| Aug.          | 5.28                               | 4.46         | 4.25                               | 3.71         | 4.41                                | 3.59         | 4.45                         | 2.78         | 6.14                   | 4.95         |
| Sept.         | 2.95                               | 5.44         | .98                                | 4.71         | 2.56                                | 5.51         | 1.22                         | 5.24         | 1.61                   | 2.76         |
| Oct.          | 4.29                               | 2.90         | 5.83                               | 2.83         | 2.48                                | 2.33         | 3.70                         | 2.62         | 3.39                   | 1.24         |
| Nov.          | 0                                  | 1.50         | 0                                  | 1.45         | 0                                   | 1.29         | 0                            | 1.42         | 0                      | .98          |
| Dec.          | 0                                  | 1.10         | .08                                | 1.10         | 0                                   | .91          | .16                          | .97          | .08                    | .98          |
| <b>Yearly</b> | <b>28.30</b>                       | <b>30.64</b> | <b>25.15</b>                       | <b>28.01</b> | <b>27.29</b>                        | <b>28.20</b> | <b>24.72</b>                 | <b>25.94</b> | <b>32.24</b>           | <b>25.66</b> |

**RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO**  
**In Inches**

| Month  | Bajo Rio Bravo,<br>Tamps., No. 2-5 |         | Bajo Rio Bravo,<br>Tamps., No. 2-11 |         | Bajo Rio Bravo,<br>Tamps., No. 1-2 |         | Bajo Rio Bravo,<br>Tamps., No. 2-7 |         | Bajo Rio Bravo,<br>Tamps., No. 1-4 |         |
|--------|------------------------------------|---------|-------------------------------------|---------|------------------------------------|---------|------------------------------------|---------|------------------------------------|---------|
|        | 1981                               | Average | 1981                                | Average | 1981                               | Average | 1981                               | Average | 1981                               | Average |
| Jan.   | 2.83                               | 1.79    | 3.35                                | 1.53    | 2.76                               | 1.61    | 3.23                               | 1.45    | 2.72                               | 1.74    |
| Feb.   | 1.18                               | 1.31    | 1.89                                | 1.21    | .94                                | 1.73    | 1.38                               | 1.23    | .94                                | 1.18    |
| Mar.   | 3.23                               | 1.14    | 2.36                                | .70     | 3.19                               | .59     | 2.28                               | .75     | 2.76                               | .78     |
| Apr.   | .39                                | 1.66    | 0                                   | 2.62    | 1.46                               | 1.56    | .35                                | 2.73    | .98                                | 2.06    |
| May    | 4.80                               | 2.71    | 3.62                                | 2.60    | 6.93                               | 3.07    | 3.31                               | 2.55    | 6.38                               | 2.65    |
| June   | 1.65                               | 3.12    | 3.78                                | 4.23    | 2.40                               | 3.56    | 5.16                               | 3.73    | 3.74                               | 3.38    |
| July   | 2.28                               | 2.20    | 5.20                                | 2.72    | 2.36                               | 1.91    | 4.61                               | 2.44    | 2.68                               | 1.89    |
| Aug.   | 5.24                               | 3.78    | 3.58                                | 4.00    | 3.54                               | 4.03    | 4.88                               | 4.34    | 4.02                               | 3.52    |
| Sept.  | 1.14                               | 4.69    | 2.64                                | 5.38    | 1.65                               | 4.91    | 1.26                               | 5.06    | 2.24                               | 5.00    |
| Oct.   | 4.41                               | 2.78    | 2.20                                | 2.81    | 2.24                               | 2.87    | 2.28                               | 2.54    | 4.17                               | 2.74    |
| Nov.   | 0                                  | 1.34    | 0                                   | 1.26    | 0                                  | 1.30    | 0                                  | 1.45    | 0                                  | 1.18    |
| Dec.   | .47                                | 1.24    | .08                                 | 1.29    | .08                                | 1.06    | 1.30                               | 1.09    | .16                                | 1.20    |
| Yearly | 27.62                              | 27.76   | 28.70                               | 30.35   | 27.55                              | 28.20   | 30.04                              | 29.36   | 30.79                              | 27.32   |

| Month  | Bajo Rio Bravo,<br>Tamps., No. 1-8 |         | Bajo Rio Bravo,<br>Tamps., No. 1-3 |         | Bajo Rio Bravo,<br>Tamps., No. 1-13 |         | Bajo Rio Bravo,<br>Tamps., No. 1-12 |         | Matamoros,<br>Tamaulipas |         |
|--------|------------------------------------|---------|------------------------------------|---------|-------------------------------------|---------|-------------------------------------|---------|--------------------------|---------|
|        | 1981                               | Average | 1981                               | Average | 1981                                | Average | 1981                                | Average | 1981                     | Average |
| Jan.   | 2.28                               | 1.57    | 3.31                               | 1.59    | 3.39                                | 1.47    | 2.76                                | 1.83    | 2.52                     | 1.80    |
| Feb.   | .83                                | 1.30    | 1.18                               | 1.22    | 1.02                                | 1.15    | .79                                 | 1.34    | 1.54                     | 1.76    |
| Mar.   | 4.02                               | .61     | 2.99                               | .60     | 2.05                                | .60     | 3.39                                | .65     | 2.01                     | .57     |
| Apr.   | .31                                | 1.87    | .51                                | 1.94    | .47                                 | 1.77    | 1.38                                | 1.92    | 1.50                     | 2.20    |
| May    | 5.75                               | 2.39    | 4.25                               | 2.40    | 5.35                                | 1.81    | 7.32                                | 2.83    | 4.80                     | 2.47    |
| June   | 2.36                               | 3.19    | 2.68                               | 3.16    | 1.30                                | 3.31    | 1.50                                | 3.19    | 2.60                     | 3.75    |
| July   | 1.50                               | 2.07    | 1.65                               | 1.88    | 2.68                                | 1.90    | 3.58                                | 2.33    | 7.09                     | 2.37    |
| Aug.   | 4.72                               | 3.60    | 3.23                               | 3.07    | 5.24                                | 3.66    | 5.00                                | 3.42    | 7.24                     | 4.43    |
| Sept.  | 3.07                               | 4.68    | 1.89                               | 5.06    | 1.06                                | 5.09    | 1.57                                | 5.23    | 2.99                     | 6.11    |
| Oct.   | 3.50                               | 3.33    | 2.91                               | 2.86    | 2.52                                | 2.48    | 2.95                                | 3.54    | 2.20                     | 3.65    |
| Nov.   | 0                                  | 1.34    | 0                                  | 1.44    | 0                                   | 1.04    | 0                                   | 1.31    | .71                      | 1.51    |
| Dec.   | .16                                | 1.28    | 1.77                               | 1.30    | .47                                 | 1.09    | 0                                   | 1.29    | .47                      | 1.82    |
| Yearly | 28.50                              | 27.23   | 26.37                              | 26.52   | 25.55                               | 25.37   | 30.24                               | 28.88   | 35.67                    | 32.44   |

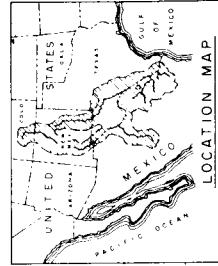
# ISOHYETAL MAP FOR YEAR 1981

RIO GRANDE DRAINAGE BASIN  
EL PASO, TEXAS TO THE GULF OF MEXICO  
PRECIPITATION IN INCHES

## LEGEND

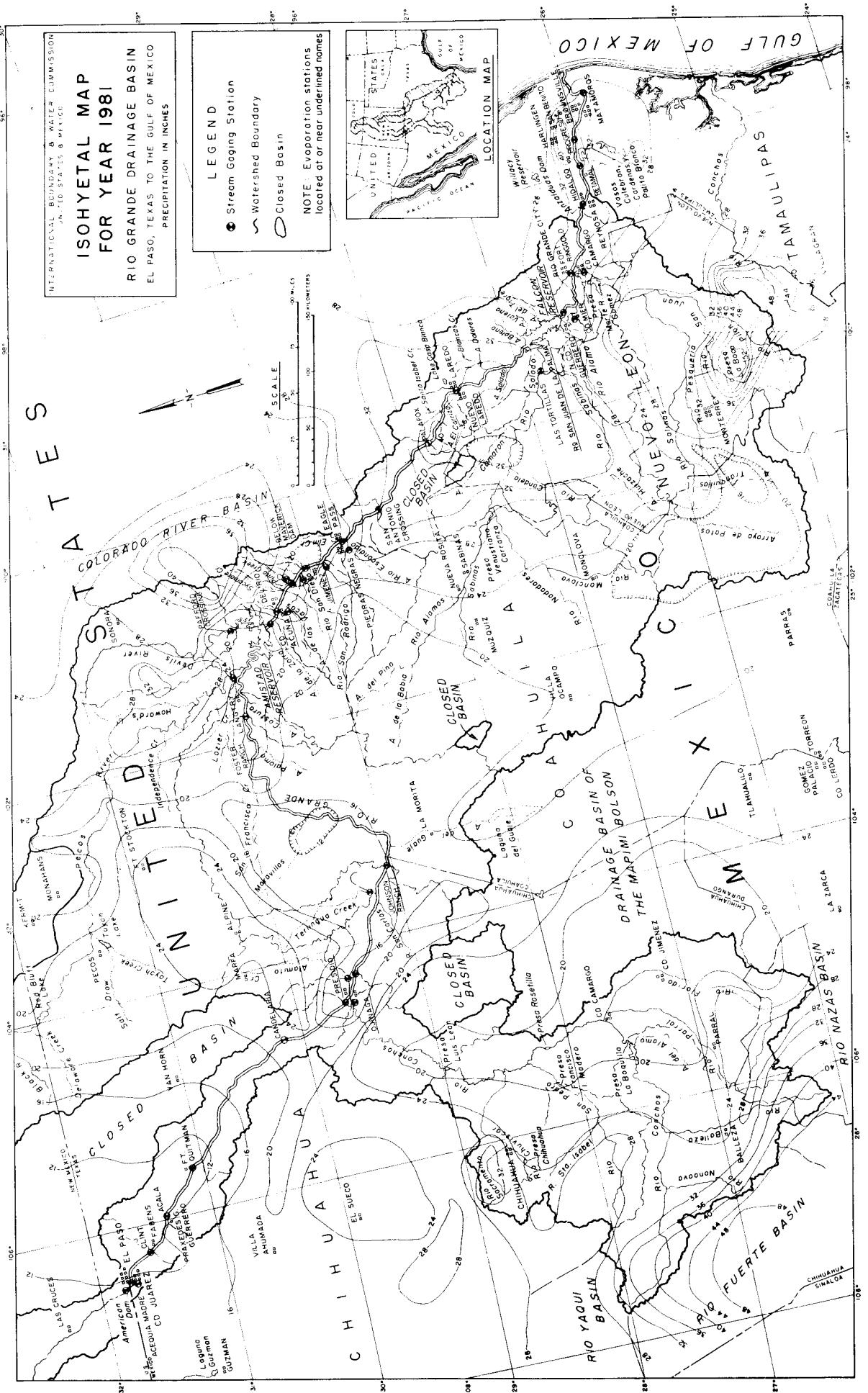
- Stream Gauging Station
- ~ Watershed Boundary
- Closed Basin

NOTE: Evaporation stations located at or near underlined names



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**AVERAGE RAINFALL ON SUBDIVISIONS OF THE RIO GRANDE WATERSHED****With Averages for the 111 Years 1871 - 1981, Inclusive****In Inches**

The precipitation records of all stations on or adjacent to the watershed subdivisions listed below have been used, with proper weighting for area, in calculating the average rainfalls shown here. The drainage area for each subdivision is shown in parentheses. The hundreds of individual records are delineated in the various "Indexes to Precipitation Records" shown in Water Bulletins Nos. 10, 14, 22, 26, and Supplement 40A.

|        | El Paso<br>to<br>Fort Quitman<br>(2,677 Square Miles) |       | Fort Quitman<br>to<br>Above Rio Conchos<br>(3,056 Square Miles) |       | * Above Rio Conchos<br>to<br>Johnson Ranch<br>(3,782 Square Miles) |       | Johnson Ranch<br>to<br>Foster Ranch<br>(12,982 Square Miles) |       |
|--------|---|-------|---|-------|--|-------|--|-------|
|        | Month   | 1981  | Period<br>Average   | 1981  | Period<br>Average  | 1981  | Period<br>Average  | 1981  |
| Jan.   | 0.96  | 0.44  | 1.01  | 0.39  | 0.97   | .34   | 0.86   | 0.48  |
| Feb.   | .37   | .37   | .47   | .27   | .17  | .28   | .14  | .37   |
| Mar.   | .31   | .32   | .52   | .25   | .41  | .20   | .73  | .40   |
| Apr.   | .59   | .26   | 1.74  | .35   | 2.90   | .41   | 3.15   | .81   |
| May    | .86   | .41   | .87   | .61   | 1.39   | .78   | 1.72   | 1.49  |
| June   | .79   | .79   | 2.51  | 1.20  | 1.32   | 1.14  | 1.04   | 1.69  |
| July   | 1.13  | 2.26  | 1.90  | 2.94  | 2.23   | 1.88  | 1.32   | 1.86  |
| Aug.   | 2.29  | 1.89  | 3.48  | 2.43  | 2.79   | 1.92  | 2.85   | 2.11  |
| Sept.  | 1.60  | 1.46  | 2.76  | 2.02  | 2.76   | 1.64  | 1.67   | 2.21  |
| Oct.   | .44   | .91   | 2.27  | 1.03  | 4.22   | .88   | 4.19   | 1.22  |
| Nov.   | .14   | .43   | 0   | .41   | .02  | .34   | .05  | .59   |
| Dec.   | .09   | .57   | 0   | .52   | .01  | .40   | 0  | .53   |
| Yearly | 9.57  | 10.11 | 17.53   | 12.42 | 19.19  | 10.21 | 17.72  | 13.76 |

|        | Pecos River<br>below<br>Sheffield<br>(3,390 Square Miles) |       | * Foster Ranch<br>to<br>Amistad Dam<br>(2,799 Square Miles) |       | Devils River<br>(4,305 Square Miles) |       | + Amistad Dam<br>to<br>Eagle Pass<br>(1,625 Square Miles) |       |
|--------|---|-------|---|-------|--------------------------------------|-------|---|-------|
|        | Month   | 1981  | Period<br>Average   | 1981  | Period<br>Average                    | 1981  | Period<br>Average   | 1981  |
| Jan.   | 1.07  | 0.68  | 0.60  | 0.51  | 0.75                                 | 0.67  | 0.86  | 0.74  |
| Feb.   | .26   | .85   | .28   | .63   | .21                                  | .72   | .22   | .89   |
| Mar.   | 1.73  | .77   | 1.04  | .76   | 2.14                                 | 1.06  | 1.70  | .99   |
| Apr.   | 6.02  | 1.87  | 6.02  | 1.37  | 4.79                                 | 1.80  | 6.52  | 1.75  |
| May    | 3.34  | 1.84  | 3.28  | 1.98  | 3.16                                 | 2.59  | 1.62  | 2.90  |
| June   | 2.18  | 2.43  | 3.31  | 2.19  | 4.05                                 | 2.64  | 5.26  | 2.50  |
| July   | .71   | 1.85  | .51   | 1.26  | .44                                  | 1.80  | .74   | 1.88  |
| Aug.   | 2.65  | 2.02  | 1.44  | 1.68  | 3.81                                 | 2.16  | .98   | 1.97  |
| Sept.  | 1.31  | 2.52  | .17   | 2.36  | .49                                  | 2.97  | 1.09  | 3.04  |
| Oct.   | 5.63  | 1.86  | 2.13  | 1.46  | 6.50                                 | 2.21  | 3.54  | 2.07  |
| Nov.   | .06   | .93   | 0   | .76   | .14                                  | 1.49  | 0   | 1.04  |
| Dec.   | .01   | .72   | .02   | .61   | T                                    | .96   | .06   | .85   |
| Yearly | 24.97   | 18.34 | 18.80   | 15.57 | 26.48                                | 21.07 | 22.59   | 20.62 |

|        | * Eagle Pass<br>to<br>Laredo<br>(3,795 Square Miles) |       | ** Laredo<br>to<br>Falcon Dam<br>(3,369 Square Miles) |       | ## Falcon Dam<br>to<br>Rio Grande City<br>(468 Square Miles) |       | United States Side<br>below<br>Rio Grande City<br>(986 Square Miles) |       |
|--------|--|-------|---|-------|--|-------|--|-------|
|        | Month  | 1981  | Period<br>Average                                     | 1981  | Period<br>Average  | 1981  | Period<br>Average  | 1981  |
| Jan.   | 1.22   | 0.72  | 1.71  | 0.75  | 2.34   | 0.89  | 2.93   | 1.27  |
| Feb.   | .25  | .79   | .69   | .79   | .51  | .82   | 1.09   | 1.08  |
| Mar.   | 1.78   | .92   | 1.92  | .79   | 1.28   | .92   | 2.90   | 1.03  |
| Apr.   | 6.43   | 1.68  | 3.75  | 1.42  | 3.78   | 1.21  | 2.27   | 1.41  |
| May    | 4.64   | 3.13  | 7.33  | 3.20  | 3.65   | 2.41  | 6.13   | 2.80  |
| June   | 5.01   | 2.47  | 4.54  | 2.02  | 3.92   | 2.11  | 4.57   | 2.56  |
| July   | 1.13   | 1.47  | 3.79  | 2.09  | 3.04   | 1.90  | 2.70   | 1.79  |
| Aug.   | 2.70   | 2.31  | 3.32  | 1.90  | 3.90   | 2.15  | 4.64   | 2.42  |
| Sept.  | 3.45   | 3.04  | .69   | 3.09  | .63  | 3.56  | 1.68   | 4.37  |
| Oct.   | 2.87   | 1.88  | 3.48  | 1.66  | 2.85   | 1.94  | 3.90   | 2.57  |
| Nov.   | 0  | .95   | 0   | 1.52  | .05  | .79   | .24  | 1.36  |
| Dec.   | .07  | .95   | .10   | .82   | .09  | .67   | .31  | 1.24  |
| Yearly | 29.55  | 20.27 | 31.32   | 20.05 | 26.04  | 19.37 | 33.36  | 23.90 |

\* Excluding Rio Conchos, Alamito, and Terlingua Creeks      # Excluding Pecos and Devils Rivers

+ Excluding Arroyo Las Vacas, San Felipe Creek, Pinto Creek, Rio San Diego, and Rio San Rodrigo

! Excluding Rio Escondido      ## Excluding Rio Salado above old Cd. Guerrero

## Excluding Rio Alamo and Rio San Juan

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

The precipitation records of stations listed below began on the date shown and extend through 1981. For detailed information regarding sources of data, specific periods of record, and other pertinent matters relative to these and additional rainfall stations on the Rio Grande watershed, see "Index to Precipitation Records" in Water Bulletins Nos. 10, 14, 22, 26, and Supplement 40A. With the exception of Las Cruces, New Mexico, all United States precipitation stations listed below are in Texas, while those in Mexico are in the indicated state as shown.

## In United States

| NAME OF STATION                              | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>(FT.) | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION             | OBSERVER              |
|--|--------------|---------------|----------------|----------------|-----------------|--------------------------------------|-----------------------|
| Acalá Station                                | R            | 31° 23'       | 105° 59'       | 3,550          | # 1938          | El Paso - Fort Quitman               | I. B. & W. C.         |
| Adobe Ranch                                  | S            | 29° 46'       | 104° 34'       | 2,550          | # 1950          | Fort Quitman -<br>Above Rio Conchos  | T. C. Davis           |
| American Dam                                 | S            | 31° 47'       | 106° 32'       | 3,730          | # 1938          | El Paso - Fort Quitman               | I. B. & W. C.         |
| Amistad Dam                                  | R            | 29° 28'       | 101° 02'       | 1,150          | July 1962       | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.         |
| Amistad Reservoir near Comstock              | C            | 29° 33'       | 101° 13'       | 1,130          | # 1970          | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.         |
| Apache Ranch                                 | C            | 27° 56'       | 99° 56'        | 500            | # 1953          | Eagle Pass - Laredo                  | I. B. & W. C.         |
| Arledge, W. A. Ranch                         | S            | 29° 58'       | 101° 38'       | 1,950          | # June 1933     | Foster Ranch -<br>Amistad Dam        | Ranch Foreman         |
| Arroyo Tigre Chiquito                        | C            | 26° 41'       | 99° 07'        | 314            | # Apr. 1954     | Laredo - Falcon Dam                  | W. A. Arledge         |
| Baker, A. A. Ranch                           | R            | 29° 44'       | 101° 09'       | 1,720          | July 1962       | Devils River                         | I. B. & W. C.         |
| Bakers Crossing                              | S            | 29° 58'       | 101° 09'       | 1,520          | # Apr. 1955     | Devils River                         | James Baker           |
| Big Satan Creek Station                      | C            | 29° 40'       | 100° 58'       | 1,150          | Nov. 1968       | Devils River                         | I. B. & W. C.         |
| Billings Ranch                               | S            | 30° 02'       | 101° 38'       | 1,970          | # Mar. 1969     | Foster Ranch -<br>Amistad Dam        | Newman Billings       |
| Brite, J. G. Ranch                           | R            | 29° 33'       | 101° 01'       | 1,150          | # Sep. 1962     | Devils River                         | I. B. & W. C.         |
| Brotherton Ranch                             | V            | 29° 42'       | 101° 19'       | 1,400          | 1961            | Foster Ranch -<br>Amistad Dam        | Perry Calk            |
| Buoy No. 11                                  | C            | 29° 31'       | 101° 10'       | #              | # Dec. 1969     | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.         |
| Buttrill Ranch                               | S            | 30° 00'       | 103° 16'       | 3,500          | Mar. 1952       | Johnson Ranch -<br>Foster Ranch      | Tom B. Leary          |
| Canon Diablo                                 | C            | 28° 39'       | 100° 27'       | 700            | # 1964          | Eagle Pass - Laredo                  | I. B. & W. C.         |
| Castolon                                     | S            | 29° 08'       | 103° 31'       | 2,100          | # Mar. 1953     | Above Rio Conchos -<br>Johnson Ranch | National Park Service |
| CCWID #11 (Bayview Dist. Off.) Avg. 18 Gages | S            | 26° 08'       | 97° 21'        | 25             | # 1952          | Lower Rio Grande Valley              | CCWID #11             |
| CCWCID #19 (Adams Gardens)                   | S            | 26° 10'       | 97° 47'        | 50             | 1952            | Lower Rio Grande Valley              | CCWCID #19            |
| Chittim Ranch                                | C            | 28° 44'       | 100° 28'       | 810            | Mar. 1959       | Amistad Dam - Eagle Pass             | I. B. & W. C.         |
| Clint Station                                | R            | 31° 32'       | 106° 14'       | 3,630          | # 1939          | El Paso - Fort Quitman               | I. B. & W. C.         |
| Coal Mine                                    | R            | 28° 48'       | 100° 28'       | 770            | # Mar. 1959     | Amistad Dam - Eagle Pass             | I. B. & W. C.         |
| Comstock                                     | R            | 29° 41'       | 101° 10'       | 1,530          | May 1939        | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.         |
| Continental Ranch                            | S            | 29° 51'       | 101° 18'       | 1,560          | Mar. 1965       | Pecos River Below<br>Sheffield       | Julio Crowder         |
| Cooper Ranch                                 | C            | 28° 50'       | 100° 27'       | 800            | Mar. 1959       | Amistad Dam - Eagle Pass             | I. B. & W. C.         |
| Corralitos Ranch                             | C            | 27° 07'       | 99° 25'        | 346            | 1953            | Laredo - Falcon Dam                  | I. B. & W. C.         |
| Cow Creek near Comstock                      | C            | 29° 37'       | 101° 12'       | 1,310          | # Apr. 1965     | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.         |
| Cox, C. F. Headquarters                      | V            | 30° 09'       | 102° 46'       | 3,500          | # 1977          | Johnson Ranch -<br>Foster Ranch      | I. B. & W. C.         |
| Crane, Ed Ranch                              | S            | 29° 51'       | 101° 05'       | 1,630          | # 1955          | Devils River                         | C. F. Cox             |
| Cuervo Creek Station                         | C            | 28° 21'       | 100° 19'       | 620            | 1954            | Eagle Pass - Laredo                  | I. B. & W. C.         |
| Dead Mans Canyon near Comstock               | C            | 29° 47'       | 101° 19'       | 1,320          | # Sep. 1967     | Pecos River below<br>Sheffield       | I. B. & W. C.         |
| Devils Lake                                  | R            | 29° 35'       | 100° 59'       | 1,158          | # May 1939      | Devils River                         | I. B. & W. C.         |
| Devils River at Caughorn Ranch               | S            | 30° 05'       | 101° 07'       | 1,656          | # Apr. 1976     | Devils River                         | I. B. & W. C.         |
| Dolan Springs                                | C            | 29° 54'       | 100° 59'       | 1,360          | Feb. 1966       | Devils River                         | I. B. & W. C.         |
| Dove Mountain Ranch                          | S            | 29° 48'       | 102° 54'       | 2,880          | # Mar. 1952     | Johnson Ranch -<br>Foster Ranch      | Sam Cavness           |
| Dryden                                       | S            | 30° 03'       | 102° 07'       | 2,130          | # 1931          | Johnson Ranch -<br>Foster Ranch      | Lewis Cash            |
| Eagle Pass                                   | S            | 28° 42'       | 100° 30'       | 815            | 1964            | Eagle Pass - Laredo                  | I. B. & W. C.         |
| Edinburg Filtration Plant                    | S            | 26° 18'       | 98° 10'        | 100            | 1952            | Lower Rio Grande Valley              | City of Edinburg      |
| Elephant Mountain Ranch                      | S            | 30° 01'       | 103° 34'       | 4,150          | # 1952          | Johnson Ranch -<br>Foster Ranch      | R. Schoenfeldt        |
| El Indio                                     | S            | 28° 31'       | 100° 19'       | 725            | # 1941          | Eagle Pass - Laredo                  | Glen Stidham          |
| Elm Creek Station                            | C            | 28° 46'       | 100° 30'       | 720            | 1959            | Amistad Dam - Eagle Pass             | I. B. & W. C.         |
| Erekson Ranch                                | S            | 29° 56'       | 100° 34'       | 2,330          | # 1955          | Devils River                         | Bob Erekson           |
| Evans Creek near Comstock                    | C            | 29° 32'       | 101° 06'       | 1,180          | July 1969       | Laredo - Falcon Dam                  | I. B. & W. C.         |
| Falcon Dam                                   | S            | 26° 33'       | 99° 08'        | 323            | # Apr. 1950     | Eagle Pass - Laredo                  | I. B. & W. C.         |
| Farias Ranch                                 | R            | 28° 36'       | 100° 20'       | 720            | # Mar. 1959     | Devils River                         | I. B. & W. C.         |
| Fawcett, H. K. Ranch                         | C            | 29° 52'       | 100° 54'       | 1,550          | # 1941          | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.         |
| Feeley                                       | C            | 29° 34'       | 101° 07'       | 1,250          | # Apr. 1965     | Eagle Pass - Laredo                  | I. B. & W. C.         |
| Fort Hancock Bridge                          | S            | 31° 16'       | 105° 51'       | 3,500          | # Apr. 1940     | El Paso - Fort Quitman               | I. B. & W. C.         |
| Fort McIntosh (Laredo)                       | S            | 27° 30'       | 99° 31'        | 410            | # 1850          | Eagle Pass - Laredo                  | I. B. & W. C.         |

S Standard R Recording

C Cumulative

V Visual

# Reservoir surface

# Some months or years missing

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## In United States

| NAME OF STATION                          | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>(FT.) | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION            | OBSERVER                |
|--|--------------|---------------|----------------|----------------|-----------------|-------------------------------------|-------------------------|
| Fort Quitman                             | R            | 31° 06'       | 105° 36'       | 3,430          | # 1937          | Fort Quitman -<br>Above Rio Conchos | I. B. & W. C.           |
| Foster, Ross Ranch                       | C            | 29° 47'       | 101° 45'       | 1,230          | May 1961        | Johnson Ranch -<br>Foster Ranch     | I. B. & W. C.           |
| Garciasville                             | R            | 26° 20'       | 98° 41'        | 200            | #Apr. 1957      | Lower Rio Grande Valley             | I. B. & W. C.           |
| Gillis Headquarters Ranch                | S            | 29° 37'       | 100° 47'       | 1,410          | 1968            | Amistad Dam - Eagle Pass            | Jake Schiller           |
| Gillis Ranch                             | S            | 29° 41'       | 101° 03'       | 1,440          | # 1965          | Devils River                        | Walter Gillis           |
| Goldwire Ranch                           | C            | 29° 44'       | 100° 57'       | 1,685          | Nov. 1968       | Devils River                        | Jake Schiller           |
| Guayuco Arroyo                           | R            | 31° 10'       | 105° 40'       | 3,600          | #May 1940       | El Paso - Fort Quitman              | I. B. & W. C.           |
| Harrow Ranch                             | C            | 29° 50'       | 101° 11'       | 1,695          | Mar. 1969       | Devils River                        | I. B. & W. C.           |
| HCWCID #6 Goodwin<br>Pump No. 3          | S            | 26° 16'       | 98° 24'        | 175            | # 1953          | Lower Rio Grande Valley             | HCWCID #6               |
| HCWCID #6 Goodwin<br>Pump No. 3A         | S            | 26° 14'       | 98° 22'        | 130            | # 1954          | Lower Rio Grande Valley             | HCWCID #6               |
| HCWCID #6 Goodwin<br>Pump No. 4          | S            | 26° 16'       | 98° 21'        | 185            | 1958            | Lower Rio Grande Valley             | HCWCID #6               |
| HCWCID #6 Goodwin<br>Pump No. 4B         | S            | 26° 18'       | 98° 23'        | 210            | # 1953          | Lower Rio Grande Valley             | HCWCID #6               |
| HCWCID #6 Goodwin<br>Pump No. 5          | S            | 26° 22'       | 98° 21'        | 225            | # 1953          | Lower Rio Grande Valley             | HCWCID #6               |
| HCWCID #15 (Edinburg<br>Office)          | S            | 26° 23'       | 98° 09'        | 85             | 1952            | Lower Rio Grande Valley             | HCWCID #15              |
| Huisache Ranch                           | C            | 26° 57'       | 99° 21'        | 383            | Aug. 1953       | Laredo - Falcon Dam                 | I. B. & W. C.           |
| Hutto Ranch No. 1                        | R            | 29° 30'       | 100° 50'       | 1,240          | 1964            | Devils River                        | I. B. & W. C.           |
| Hutto Ranch No. 2                        | R            | 29° 29'       | 100° 54'       | 1,210          | 1964            | Devils River                        | I. B. & W. C.           |
| Indio Ranch                              | S            | 28° 31'       | 100° 22'       | 700            | 1959            | Eagle Pass - Laredo                 | Ernest Scales           |
| James, Lewis Ranch                       | S            | 30° 11'       | 102° 07'       | 2,275          | 1966            | Johnson Ranch -<br>Foster Ranch     | Lewis James             |
| Johnson Ranch                            | C            | 29° 01'       | 103° 23'       | 2,050          | #July 1933      | Johnson Ranch -<br>Foster Ranch     | I. B. & W. C.           |
| Keisling Farm                            | S            | 28° 23'       | 100° 17'       | 740            | Dec. 1958       | Eagle Pass - Laredo                 | Robert Smith            |
| Kelly, P. W. Ranch                       | S            | 29° 46'       | 101° 12'       | 1,750          | # 1965          | Foster Ranch -<br>Amistad Dam       | Bobby Kelly             |
| King, Martin Ranch                       | R            | 29° 44'       | 101° 22'       | 1,460          | Nov. 1954       | Foster Ranch -<br>Amistad Dam       | I. B. & W. C.           |
| La Feria Materials Yard                  | V            | 26° 10'       | 97° 50'        | 60             | # 1960          | Lower Rio Grande Valley             | CCWCID #3               |
| La Feria Pumping Plant                   | S            | 26° 03'       | 97° 50'        | 60             | 1952            | Lower Rio Grande Valley             | CCWCID #3               |
| La Joya                                  | C            | 26° 15'       | 98° 29'        | 150            | # 1957          | Lower Rio Grande Valley             | I. B. & W. C.           |
| La Macolla Farm                          | S            | 30° 00'       | 104° 41'       | 2,750          | Apr. 1977       | Fort Quitman -<br>Above Rio Conchos | Tom Pelton              |
| La Mota Ranch                            | S            | 29° 33'       | 103° 59'       | 3,854          | # 1943          | Alamito Creek                       | John Rice               |
| Laredo Water Plant                       | S            | 27° 33'       | 99° 31'        | 410            | # 1930          | Eagle Pass - Laredo                 | Laredo Water<br>Plant   |
| Las Cruces, New Mexico                   | S            | 32° 19'       | 106° 47'       | 3,893          | 1975            | Caballo Dam - El Paso               | I. B. & W. C.           |
| Las Moras Creek                          | S            | 29° 00'       | 100° 38'       | 800            | 1958            | Amistad Dam - Eagle Pass            | Lou McGee               |
| Lateral No. 2 Spill                      | C            | 28° 56'       | 100° 38'       | 760            | Mar. 1959       | Amistad Dam - Eagle Pass            | I. B. & W. C.           |
| Lateral No. 12 Headgate                  | C            | 28° 54'       | 100° 34'       | 800            | 1959            | Amistad Dam - Eagle Pass            | I. B. & W. C.           |
| Lateral 15 Spill                         | C            | 28° 51'       | 100° 34'       | 740            | # 1959          | Amistad Dam - Eagle Pass            | I. B. & W. C.           |
| Latham Ranch                             | S            | 30° 13'       | 101° 22'       | 2,120          | # 1965          | Pecos River below<br>Sheffield      | John and Bob<br>Latham  |
| Laughlin Air Force Base                  | S            | 29° 21'       | 100° 47'       | 1,080          | Dec. 1958       | Amistad Dam - Eagle Pass            | U. S. A. F.             |
| Lewis, Billie C., Jr.<br>Ranch           | S            | 29° 33'       | 100° 40'       | 1,400          | # 1964          | Amistad Dam - Eagle Pass            | Billie C.<br>Lewis, Jr. |
| Line Store                               | S            | 30° 40'       | 100° 57'       | 2,400          | #Oct. 1962      | Devils River                        | Claud Ward              |
| Long Ranch                               | R            | 29° 28'       | 100° 57'       | 1,140          | Oct. 1971       | Devils River                        | I. B. & W. C.           |
| Los Ebanos                               | C            | 26° 14'       | 98° 34'        | 150            | #Apr. 1957      | Lower Rio Grande Valley             | I. B. & W. C.           |
| Lowry, Cliff Ranch                       | R            | 29° 39'       | 100° 52'       | 1,490          | June 1962       | Devils River                        | I. B. & W. C.           |
| Lowry Ranch No. 2                        | R            | 29° 37'       | 100° 56'       | 1,160          | May 1965        | Devils River                        | I. B. & W. C.           |
| Maverick County Canal<br>Headgate        | S            | 29° 10'       | 100° 46'       | 870            | #Mar. 1948      | Amistad Dam - Eagle Pass            | MCWCID #1               |
| Maverick Power Plant                     | S            | 28° 50'       | 100° 33'       | 800            | June 1952       | Amistad Dam - Eagle Pass            | C. P. & L. Co.          |
| McGonagill Ranch -<br>Headquarters       | V            | 30° 20'       | 102° 58'       | 4,150          | Apr. 1952       | Johnson Ranch -<br>Foster Ranch     | W. L. Groth             |
| McGonagill - East Mill                   | V            | 30° 21'       | 102° 55'       | 4,050          | #May 1952       | Johnson Ranch -<br>Foster Ranch     | W. L. Groth             |
| McGonagill Ranch -<br>Big Peters Pasture | V            | 30° 16'       | 102° 53'       | 4,450          | 1981            | Foster Ranch                        | W. L. Groth             |
| Middle Fork San Pedro                    | C            | 29° 30'       | 100° 53'       | 1,170          | #June 1969      | Devils River                        | I. B. & W. C.           |
| Miers, H. T. Ranch -<br>Headquarters     | C            | 29° 44'       | 100° 51'       | 1,760          | # 1957          | Devils River                        | I. B. & W. C.           |
| Miers, H. T. Ranch No. 2                 | R            | 29° 44'       | 100° 53'       | 1,600          | Apr. 1964       | Devils River                        | I. B. & W. C.           |
| Miller, Eugene Ranch                     | S            | 30° 26'       | 101° 10'       | 2,150          | July 1975       | Devils River                        | Eugene Miller           |
| Mitchell, Kerr Ranch                     | S            | 30° 13'       | 104° 00'       | 4,450          | # 1941          | Alamito Creek                       | Mrs. K. Mitchell        |
| Neely Ranch                              | S            | 30° 59'       | 105° 32'       | 3,350          | #Aug. 1941      | Fort Quitman -<br>Above Rio Conchos | Mrs. Tom Neely          |
| New Mission Pumping Plant                | S            | 26° 11'       | 98° 24'        |                | #Aug. 1961      | Lower Rio Grande Valley             | HCWCID #14              |
| 96 Ranch Headquarters                    | V            | 30° 40'       | 104° 50'       | 3,870          | 1972            | Fort Quitman -<br>Above Rio Conchos | Walter Paschal          |
| Normandy                                 | S            | 28° 55'       | 100° 36'       | 780            | #Dec. 1958      | Amistad Dam - Eagle Pass            | Fannin G. Lowe          |
| North Fork San Pedro                     | C            | 29° 31'       | 100° 53'       | 1,144          | June 1969       | Devils River                        | I. B. & W. C.           |

R Recording

C Cumulative

S Standard

V Visual

# Some months or years missing

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## In United States

| NAME OF STATION                  | TYPE<br>GAGE | LATI-<br>TUD E | LONGI-<br>TUD E | ELEV.<br>(FT.) | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION          | OBSERVER                |
|----------------------------------|--------------|----------------|-----------------|----------------|-----------------|-----------------------------------|-------------------------|
| Owens Ranch                      | S            | 30° 45'        | 101° 40'        | 2,170          | #July 1963      | Pecos River below Sheffield       | Jeff Owens              |
| Pafford Crossing                 | C            | 29° 41'        | 101° 00'        | 1,180          | Feb. 1960       | Devils River                      | I. B. & W. C.           |
| Pecos River near Langtry Station | C            | 29° 48'        | 101° 27'        | 1,260          | July 1967       | Pecos River below Sheffield       | I. B. & W. C.           |
| Penitas (Edinburg Pumping Plant) | S            | 26° 14'        | 98° 27'         | 100            | July 1957       | Lower Rio Grande Valley           | B. Leadbetter           |
| Pinto Creek Station              | C            | 29° 09'        | 100° 43'        | 870            | #Dec. 1958      | Amistad Dam - Eagle Pass          | I. B. & W. C.           |
| Plata                            | S            | 29° 52'        | 104° 02'        | 3,750          | #July 1977      | Alamito Creek                     | Jim Turner              |
| Potter, A. M. Ranch              | S            | 29° 46'        | 103° 25'        | 3,440          | # 1952          | Johnson Ranch - Foster Ranch      | A. M. Potter            |
| Presidio (IB&WC Gage)            | S            | 29° 34'        | 104° 23'        | 2,550          | #Oct. 1949      | Above Rio Conchos - Johnson Ranch | I. B. & W. C.           |
| Prosser Ranch No. 1              | C            | 29° 54'        | 101° 14'        | 1,710          | Mar. 1965       | Pecos River below Sheffield       | I. B. & W. C.           |
| Prosser Ranch No. 2              | C            | 29° 59'        | 101° 16'        | 1,850          | #Mar. 1965      | Devils River                      | I. B. & W. C.           |
| Prosser Ranch No. 3              | C            | 30° 02'        | 101° 16'        | 2,020          | #Mar. 1965      | Pecos River below Sheffield       | I. B. & W. C.           |
| Quebec Ranch                     | V            | 30° 31'        | 104° 25'        | 4,600          | # 1949          | Adjacent to Alamito Creek         | Pablo Vasquez           |
| Ranchita (Continental)           | S            | 29° 50'        | 101° 20'        | 1,540          | # 1969          | Pecos River below Sheffield       | Julio Crowder           |
| Redford                          | C            | 29° 29'        | 104° 13'        | 2,500          | July 1954       | Above Rio Conchos - Johnson Ranch | I. B. & W. C.           |
| Rio Grande near Dryden           | S            | 29° 49'        | 102° 09'        | 1,350          | May 1976        | Johnson Ranch - Foster Ranch      | I. B. & W. C.           |
| Roma (International Bridge)      | S            | 26° 24'        | 99° 01'         | 230            | # 1941          | Falcon Dam - Rio Grande City      | Starr County Bridge Co. |
| Rosita Creek Siphon              | C            | 28° 41'        | 100° 24'        | 760            | # 1959          | Eagle Pass - Laredo               | I. B. & W. C.           |
| Rosita Creek Station             | C            | 28° 36'        | 100° 24'        | 700            | # 1959          | Eagle Pass - Laredo               | I. B. & W. C.           |
| Rough Canyon nr. Del Rio         | C            | 29° 35'        | 100° 56'        | 1,147          | June 1969       | Devils River                      | I. B. & W. C.           |
| San Benito Pump                  | S            | 26° 03'        | 97° 45'         | 50             | Oct. 1933       | Lower Rio Grande Valley           | I. B. & W. C.           |
| Sawyer, W. E. Ranch              | S            | 30° 28'        | 100° 47'        | 2,100          | #July 1966      | Devils River                      | Geo. Powell             |
| Sellers Ranch                    | C            | 29° 34'        | 101° 02'        | 1,190          | #Feb. 1960      | Devils River                      | I. B. & W. C.           |
| Shafter                          | V            | 29° 49'        | 104° 19'        | 3,800          | #July 1968      | Above Rio Conchos - Johnson Ranch | Raymond Wylic           |
| Shannon, Bill Ranch              | C            | 29° 57'        | 104° 40'        | 2,680          | #July 1956      | Fort Quitman - Above Rio Conchos  | Bill Shannon            |
| Slaughter Ranch                  | V            | 29° 57'        | 102° 41'        | 2,560          | # 1965          | Johnson Ranch - Foster Ranch      | Mike Wood               |
| Stewart Ranch                    | R            | 29° 35'        | 100° 52'        | 1,330          | #Feb. 1960      | Devils River                      | I. B. & W. C.           |
| Study Butte                      | S            | 29° 19'        | 103° 32'        | 2,550          | July 1977       | Terlingua Creek                   | Shirley Willard         |
| Stumberg, Steve Ranch            | R            | 30° 11'        | 102° 53'        | 4,300          | # 1943          | Johnson Ranch - Foster Ranch      | I. B. & W. C.           |
| Terlingua Creek Station          | C            | 29° 12'        | 103° 36'        | 2,215          | Mar. 1952       | Above Rio Conchos - Johnson Ranch | I. B. & W. C.           |
| Trees Farm                       | R            | 28° 38'        | 100° 25'        | 720            | #Mar. 1959      | Eagle Pass - Laredo               | I. B. & W. C.           |
| Van Dalsen Farm                  | C            | 28° 27'        | 100° 19'        | 700            | # 1959          | Eagle Pass - Laredo               | I. B. & W. C.           |
| Vinegarone                       | C            | 29° 57'        | 100° 46'        | 1,780          | May 1966        | Devils River                      | I. B. & W. C.           |
| Walker Ranch                     | C            | 29° 50'        | 101° 14'        | 1,530          | July 1969       | Devils River                      | I. B. & W. C.           |
| Wardlaw Standard Ranch           | S            | 29° 19'        | 100° 38'        | 1,070          | Apr. 1977       | Pinto Creek                       | Hadly Wardlaw           |
| Weyrich Farm                     | C            | 28° 40'        | 100° 24'        | 760            | Sep. 1962       | Eagle Pass - Laredo               | I. B. & W. C.           |
| Whipple Farm                     | S            | 26° 04'        | 97° 29'         | 25             | # 1952          | Lower Rio Grande Valley           | Harry Whipple           |
| Whitehead Bros. Ranch            | C            | 30° 02'        | 100° 52'        | 1,900          | May 1966        | Devils River                      | I. B. & W. C.           |
| Whitehead, Tuffy Ranch           | R            | 29° 38'        | 101° 07'        | 1,420          | July 1962       | Devils River                      | I. B. & W. C.           |
| White V- Ranch                   | S            | 30° 18'        | 102° 09'        | 2,650          | #Apr. 1952      | Johnson Ranch - Foster Ranch      | Mrs. Tucker White       |
| Wipff Ranch                      | C            | 29° 00'        | 100° 35'        | 840            | Mar. 1959       | Amistad Dam - Eagle Pass          | I. B. & W. C.           |
| Woodward, J. F. Ranch            | S            | 30° 08'        | 103° 36'        | 4,750          | # 1954          | Johnson Ranch - Foster Ranch      | J. F. Woodward          |
| Wuensche Farm                    | S            | 28° 24'        | 100° 19'        | 670            | # 1952          | Eagle Pass - Laredo               | I. B. & W. C.           |
| Wynne, Harold Ranch Headquarters | S            | 29° 29'        | 103° 23'        | 3,610          | # 1974          | Johnson Ranch - Foster Ranch      | Harold Wynne            |
| Yarborough Ranch                 | S            | 30° 06'        | 103° 36'        | 4,550          | # 1966          | Johnson Ranch - Foster Ranch      | H. D. Smith             |
| Zapata Water Plant               | S            | 26° 54'        | 99° 16'         | 380            | #May 1953       | Laredo - Falcon Dam               | Zapata Water Plant      |
| Zuberbueler Ranch                | S            | 29° 41'        | 101° 14'        | 1,460          | Feb. 1975       | Foster Ranch - Amistad Dam        | J.U. Zuberbueler        |

S Standard      R Recording      C Cumulative      V Visual

# Some months or years missing

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## In Mexico

| NAME OF STATION                         | TYPE GAGE | LATI-TUDE | LONGI-TUDE | ELEV. (FT.) | RECORD BEGAN | WATERSHED SUBDIVISION            | OBSERVER                     |
|---|-----------|-----------|------------|-------------|--------------|----------------------------------|------------------------------|
| Adjuntas, Nuevo Leon                    | S         | 25° 18'   | 100° 08'   | !           | # 1958       | Rio San Juan                     | S. A. R. H.                  |
| Agualeguas, Nuevo Leon                  | S         | 26° 18'   | 99° 33'    | !           | # 1979       | Rio Alamo                        | S. A. R. H.                  |
| Alamo, Nuevo Leon                       | S         | 26° 24'   | 100° 23'   |             | 1981         | Rio Salado                       | S. A. R. H.                  |
| Allende, Coahuila                       | S         | 28° 21'   | 100° 51'   | 1,170       | # 1974       | Eagle Pass - Laredo              | S. A. R. H.                  |
| Amistad Reservoir near Tlaloc, Coahuila | C         | 29° 26'   | 101° 07'   | 1,250       | 1970         | Foster Ranch - Amistad Dam       | I. B. & W. C.                |
| Anahuac, Nuevo Leon                     | S         | 27° 15'   | 100° 08'   | 656         | #June 1933   | Rio Salado                       | S. A. R. H.                  |
| Aniego 166, Tamaulipas                  | C         | 26° 46'   | 99° 15'    | 310         | 1964         | Laredo - Falcon Dam              | I. B. & W. C.                |
| Apodaca, Nuevo Leon                     | S         | 25° 46'   | 100° 11'   | 1,330       | #Feb. 1964   | Rio San Juan                     | S. A. R. H.                  |
| Arguelles, Tamaulipas                   | C         | 26° 11'   | 98° 28'    | !           | 1962         | Lower Rio Grande Valley          | I. B. & W. C.                |
| Bachiniva, Chihuahua                    | S         | 28° 46'   | 107° 15'   | 6,250       | # 1952       | Adjacent to Rio Conchos          | Meteor. Service of Mexico    |
| Bajo Rio Bravo, Tamps.                  |           |           |            |             |              |                                  |                              |
| No. 1-2                                 | S         | 25° 56'   | 97° 46'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 1-3                                 | S         | 25° 50'   | 97° 42'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 1-4                                 | S         | 25° 51'   | 97° 45'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 1-12                                | S         | 25° 56'   | 97° 38'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 1-13                                | S         | 25° 44'   | 97° 40'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 1-18                                | S         | 25° 49'   | 97° 42'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 2-5                                 | S         | 25° 48'   | 97° 49'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 2-6                                 | S         | 25° 44'   | 97° 53'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 2-7                                 | S         | 25° 39'   | 97° 42'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 4-8                                 | S         | 25° 40'   | 97° 55'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 4-10                                | S         | 25° 36'   | 97° 52'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 2-11                                | S         | 25° 35'   | 97° 46'    | !           | #            | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-14                                | S         | 25° 56'   | 97° 59'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-15                                | S         | 25° 46'   | 98° 01'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-17                                | S         | 25° 49'   | 97° 58'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 4-16                                | S         | 25° 35'   | 98° 00'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| Bajo Rio San Juan, Tamps.               |           |           |            |             |              |                                  |                              |
| No. 2-29                                | S         | 26° 10'   | 98° 38'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 2-33                                | S         | 26° 10'   | 98° 28'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 2-38                                | S         | 26° 06'   | 98° 34'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-47                                | S         | 25° 58'   | 98° 07'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-55                                | S         | 25° 52'   | 98° 12'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-58                                | S         | 25° 50'   | 98° 11'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-60                                | S         | 25° 46'   | 98° 10'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| No. 3-63                                | S         | 25° 41'   | 98° 06'    | !           | 1964         | Lower Rio Grande Valley          | S. A. R. H.                  |
| Balleza, Chihuahua                      | S         | 26° 57'   | 106° 21'   | 5,870       | # 1903       | Rio Conchos                      | Meteor. Service of Mexico    |
| Banderas, Chihuahua                     | S         | 31° 01'   | 105° 35'   | !           | # 1963       | Fort Quitman - Above Rio Conchos | S. A. R. H.                  |
| Bustamante, Nuevo Leon                  | S         | 26° 32'   | 100° 31'   | 1,450       | # 1958       | Rio Salado                       | S. A. R. H.                  |
| Cabezonas, Nuevo Leon                   | S         | 24° 59'   | 99° 45'    | !           | # 1962       | Adjacent to Rio San Juan         | S. A. R. H.                  |
| Camargo, Chihuahua                      | S         | 27° 42'   | 105° 10'   | 3,950       | #Oct. 1956   | Rio Conchos                      | S. A. R. H.                  |
| Camargo, Tamaulipas                     | S         | 26° 19'   | 98° 50'    | 230         | # 1953       | Falcon Dam - Rio Grande City     | S. A. R. H.                  |
| Candela, Coahuila                       | S         | 26° 50'   | 100° 40'   | !           | # 1970       | Rio Salado                       | S. A. R. H.                  |
| Carbonera, Nuevo Leon                   | S         | 24° 49'   | 100° 47'   | !           | 1958         | Rio San Juan                     | S. A. R. H.                  |
| Carichic, Chihuahua                     | S         | 27° 55'   | 107° 04'   |             | #May 1961    | Rio Conchos                      | Meteor. Service of Chihuahua |
| Casillas, Nuevo Leon                    | S         | 25° 12'   | 100° 12'   | 4,060       | # 1958       | Rio San Juan                     | S. A. R. H.                  |
| Castanos, Coahuila                      | S         | 26° 47'   | 101° 27'   | 2,440       | #Oct. 1932   | Rio Salado                       | Meteor. Service of Mexico    |
| Cd. Acuna, Coahuila                     | S         | 29° 20'   | 100° 57'   | 900         | 1951         | Amistad Dam - Eagle Pass         | I. B. & W. C.                |
| Cd. Diaz Ordaz, Tamaulipas              | S         | 26° 14'   | 98° 36'    | 130         | # 1953       | Lower Rio Grande Valley          | S. A. R. H.                  |
| Cd. Guerrero, Chihuahua                 | S         | 28° 33'   | 107° 29'   | 6,560       | #May 1903    | Adjacent to Rio Conchos          | Meteor. Service of Mexico    |
| Cd. Mier, Tamaulipas                    | S         | 26° 26'   | 99° 09'    | 260         | Oct. 1955    | Falcon Dam - Rio Grande City     | I. B. & W. C.                |
| Cd. Mier Km. 8, SW, Tamaulipas          | C         | 26° 23'   | 99° 14'    | !           | 1962         | Rio Alamo                        | I. B. & W. C.                |
| Corralvo, Nuevo Leon                    | R         | 26° 05'   | 99° 37'    | 1,130       | #Nov. 1938   | Rio San Juan                     | S. A. R. H.                  |
| Cerritos, Nuevo Leon                    | S         | 25° 31'   | 100° 12'   | !           | # 1958       | Rio San Juan                     | S. A. R. H.                  |
| Cerro Prieto, Nuevo Leon                | S         | 25° 56'   | 99° 23'    | 890         | #May 1958    | Rio San Juan                     | S. A. R. H.                  |
| Cienega de Flores, Nuevo Leon           | R         | 25° 57'   | 100° 10'   | 1,770       | #Apr. 1938   | Rio San Juan                     | S. A. R. H.                  |
| Cienega del Toro, Nuevo Leon            | S         | 25° 05'   | 100° 20'   | 7,010       | # 1958       | Rio San Juan                     | S. A. R. H.                  |
| Cola de Caballo, Nuevo Leon             | S         | 25° 41'   | 100° 25'   | !           | 1978         | Rio San Juan                     | S. A. R. H.                  |
| Colombia, Nuevo Leon                    | C         | 27° 42'   | 99° 46'    | !           | # 1964       | Eagle Pass - Laredo              | I. B. & W. C.                |
| Colombia, Nuevo Leon                    | S         | 27° 42'   | 99° 45'    |             | #Sept. 1976  | Eagle Pass - Laredo              | S. A. R. H.                  |
| Colonia Anahuac, Chihuahua              | S         | 28° 29'   | 106° 44'   | 6,550       | 1961         | Rio Conchos                      | Chih. S.A.                   |
| Comales, Tamaulipas                     | R         | 26° 11'   | 98° 55'    | 260         | #Mar. 1938   | Rio San Juan                     | S. A. R. H.                  |
| Control, Tamaulipas                     | S         | 25° 58'   | 97° 49'    | 59          | #June 1942   | Lower Rio Grande Valley          | S. A. R. H.                  |
| Coyame, Chihuahua                       | S         | 29° 28'   | 105° 06'   | !           | #Nov. 1961   | Rio Conchos                      | Meteor. Service of Chihuahua |
| Cuatro Cienegas, Coahuila               | S         | 26° 59'   | 102° 04'   | 2,430       | #June 1923   | Rio Salado                       | S. A. R. H.                  |

S Standard      C Cumulative      R Recording      ! Not available      # Some months or years missing

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## In Mexico

| NAME OF STATION                              | TYPE-GAGE | LATI-TUDE | LONGI-TUDE | ELEV. (FT.) | RECORD BEGAN | WATERSHED SUBDIVISION                     | OBSERVER                     |
|--|-----------|-----------|------------|-------------|--------------|---|------------------------------|
| Cuauhtemoc, Chihuahua                        | S         | 28° 24'   | 106° 52'   | 7,250       | #June 1923   | Adjacent to Rio Conchos                   | Meteor. Service of Mexico    |
| Delicias, Chihuahua                          | S         | 28° 11'   | 105° 28'   | 3,710       | #Aug. 1933   | Rio Conchos                               | S. A. R. H.                  |
| Ejido Eutimias, Coahuila                     | S         | 28° 20'   | 102° 45'   | 3,440       | #Apr. 1972   | Johnson Ranch - Foster Ranch              | S. A. R. H.                  |
| Ejido Marin, Nuevo Leon                      | S         | 25° 50'   | 100° 00'   | !           | Mar. 1979    | Rio San Juan                              | S. A. R. H.                  |
| Ejido lo de Mayo, Coahuila                   | S         | 27° 13'   | 101° 13'   | !           | # 1980       | Rio Salado                                | S. A. R. H.                  |
| Ejido San Miguel, Coahuila                   | S         | 29° 02'   | 100° 58'   |             | #Feb. 1976   | Eagle Pass - Laredo                       | S. A. R. H.                  |
| El Brasil, Nuevo Leon                        | S         | 25° 53'   | 98° 59'    | !           | # 1979       | Rio San Juan                              | S. A. R. H.                  |
| El Cuarenta, Chihuahua                       | S         | 30° 33'   | 105° 50'   | !           | # 1961       | Adjacent to Ft. Quitman Above Rio Conchos | Meteor. Service of Chihuahua |
| El Cuchillo, Nuevo Leon                      | S         | 25° 43'   | 99° 16'    | 590         | #June 1938   | Rio San Juan                              | S. A. R. H.                  |
| El Cuervito, Nuevo Leon                      | S         | 25° 54'   | 98° 40'    | !           | # 1980       | Rio San Juan                              | S. A. R. H.                  |
| El Cuervo, Chihuahua                         | S         | 30° 15'   | 105° 08'   | 3,840       | # 1961       | Adjacent to Ft. Quitman Above Rio Conchos | Meteor. Service of Chihuahua |
| El Maguey, Chihuahua                         | S         | 27° 37'   | 106° 09'   | 4,380       | #July 1955   | Rio Conchos                               | Meteor. Service of Chihuahua |
| El Realito, Nuevo Leon                       | S         | 25° 18'   | 99° 21'    | !           | # 1970       | Rio San Juan                              | S. A. R. H.                  |
| El Remolino, Coahuila                        | S         | 28° 45'   | 101° 05'   | 1,310       | #June 1958   | Rio San Rodrigo                           | I. B. & W. C.                |
| El Sauzal D.B., Chih.                        | S         | 31° 35'   | 106° 18'   | 3,650       | July 1970    | El Paso - Ft. Quitman                     | S. A. R. H.                  |
| El Sito, Chihuahua                           | S         | 27° 34'   | 106° 16'   | !           | July 1955    | Rio Conchos                               | Meteor. Service of Chihuahua |
| El Sueco, Chihuahua                          | S         | 29° 54'   | 106° 24'   | 5,090       | # 1958       | Adjacent to Rio Conchos                   | Meteor. Service of Chihuahua |
| El Vergel, Chihuahua                         | S         | 26° 22'   | 106° 30'   | 7,350       | # 1957       | Rio Conchos                               | Meteor. Service of Mexico    |
| Emiliano Zapata, Coahuila                    | S         | 29° 01'   | 100° 49'   | !           | #Mar. 1976   | Eagle Pass - Laredo                       | S. A. R. H.                  |
| Escalon, Chihuahua                           | S         | 26° 45'   | 104° 20'   | 4,160       | # 1957       | Adjacent to Rio Conchos                   | S. A. R. H.                  |
| Escuela de Agricultura Escobedo, Chihuahua   | S         | 31° 42'   | 106° 27'   | 3,690       | 1980         | El Paso - Ft. Quitman                     | S. A. R. H.                  |
| Espinazo, Nuevo Leon                         | S         | 26° 15'   | 101° 05'   | !           | 1980         | Rio Salado                                | S. A. R. H.                  |
| Estacion Rosario, Durango                    | S         | 26° 30'   | 105° 38'   | !           | #July 1962   | Rio Conchos                               | S. A. R. H.                  |
| Galeana, Nuevo Leon                          | S         | 24° 50'   | 100° 04'   | 5,430       | # 1958       | Adjacent to Rio San Juan                  | Meteor. Service of Mexico    |
| Gallego, Chihuahua                           | S         | 29° 50'   | 106° 23'   | 5,100       | 1958         | Adjacent to Rio Conchos                   | Meteor. Service of Chihuahua |
| Garita Km. 28, Chihuahua                     | S         | 31° 33'   | 106° 28'   | 3,990       | May 1958     | El Paso - Ft. Quitman                     | I. B. & W. C.                |
| Garza Ayala, Nuevo Leon                      | S         | 26° 29'   | 100° 03'   | !           | # 1968       | Rio Salado                                | S. A. R. H.                  |
| General Trevino, Nv. Leon                    | S         | 26° 13'   | 99° 29'    | !           | #Oct. 1976   | Rio Alamo                                 | S. A. R. H.                  |
| Gral. Bravo, Nuevo Leon                      | S         | 25° 48'   | 99° 11'    | 590         | #Sept. 1906  | Rio San Juan                              | S. A. R. H.                  |
| Gral. Cepeda, Coahuila                       | S         | 25° 23'   | 101° 29'   | 4,920       | #Aug. 1926   | Rio San Juan                              | S. A. R. H.                  |
| Gral. Teran (Experiment Station), Nuevo Leon | S         | 25° 16'   | 99° 38'    | 1,090       | #Aug. 1958   | Rio San Juan                              | S. A. R. H.                  |
| Gomez Farias, Coahuila                       | S         | 24° 58'   | 101° 53'   | !           | June 1979    | Rio San Juan                              | S. A. R. H.                  |
| Guadalupe, Chihuahua                         | S         | 31° 23'   | 106° 06'   | 3,650       | 1958         | El Paso - Ft. Quitman                     | I. B. & W. C.                |
| Guerrero, Coahuila                           | S         | 28° 19'   | 100° 23'   | 690         | #June 1958   | Eagle Pass - Laredo                       | I. B. & W. C.                |
| Hacienda El Alamo, N.Leon                    | S         | 26° 29'   | 99° 46'    | !           | # 1968       | Rio Alamo                                 | I. B. & W. C.                |
| Hacienda Mamulique, N.Leon                   | S         | 26° 07'   | 100° 14'   | !           | #Sept. 1973  | Rio San Juan                              | S. A. R. H.                  |
| Hacienda San Miguel, Coahuila                | S         | 29° 13'   | 101° 30'   | !           | # 1961       | Foster Ranch - Amistad Dam                | I. B. & W. C.                |
| Higueras, Nuevo Leon                         | S         | 25° 58'   | 100° 01'   | 1,640       | #Sept. 1906  | Rio San Juan                              | Meteor. Service of Mexico    |
| Hipolito, Coahuila                           | S         | 25° 42'   | 101° 24'   | !           | # 1980       | Rio San Juan                              | S. A. R. H.                  |
| Huachichil, Coahuila                         | S         | 25° 12'   | 100° 50'   | !           | # 1980       | Rio San Juan                              | S. A. R. H.                  |
| Iconome, Nuevo Leon                          | S         | 25° 55'   | 100° 43'   | 4,900       | # 1958       | Rio San Juan                              | S. A. R. H.                  |
| Iturbide, Nuevo Leon                         | S         | 24° 44'   | 99° 54'    | !           | 1941         | Adjacent to Rio San Juan                  | S. A. R. H.                  |
| Jarita, Nuevo Leon                           | C         | 27° 26'   | 99° 48'    | 680         | #Mar. 1961   | Laredo - Falcon Dam                       | S. A. R. H.                  |
| Jimenez, Chihuahua                           | S         | 27° 08'   | 104° 55'   | 4,490       | # 1951       | Rio Conchos                               | S. A. R. H.                  |
| Jimenez, Coahuila                            | S         | 29° 04'   | 100° 40'   | 810         | # 1951       | Amistad Dam - Eagle Pass                  | I. B. & W. C.                |
| Juarez, Chihuahua                            | S         | 31° 44'   | 106° 28'   | 3,740       | # 1903       | El Paso - Ft. Quitman                     | I. B. & W. C.                |
| Juarez, Chihuahua                            | S         | 31° 45'   | 106° 27'   |             | 1981         | El Paso - Ft. Quitman                     | S. A. R. H.                  |
| Km. 135, Chihuahua                           | S         | 28° 22'   | 105° 37'   | 3,940       | # 1962       | Rio Salado                                | S. A. R. H.                  |
| La Amistad, Coahuila                         | S         | 29° 27'   | 101° 05'   | !           | Feb. 1977    | Amistad Dam - Eagle Pass                  | I. B. & W. C.                |
| La Arena, Nuevo Leon                         | S         | 25° 46'   | 100° 01'   | !           | # 1968       | Rio San Juan                              | S. A. R. H.                  |
| La Banderia, Tamaulipas                      | C         | 26° 42'   | 99° 22'    | !           | 1962         | Laredo - Falcon Dam                       | I. B. & W. C.                |
| La Boquilla, Chihuahua                       | S         | 27° 32'   | 105° 25'   | 4,330       | # 1910       | Rio Conchos                               | Elec. Industry of Mexico     |
| La Cruz, Nuevo Leon                          | S         | 25° 28'   | 100° 26'   | !           | # 1958       | Rio San Juan                              | S. A. R. H.                  |
| La Escondida, Nuevo Leon                     | S         | 26° 16'   | 99° 46'    | !           | # 1979       | Rio San Juan                              | S. A. R. H.                  |
| La Huasteca, Nuevo Leon                      | S         | 25° 30'   | 100° 30'   | !           | # 1978       | Rio San Juan                              | S. A. R. H.                  |
| La Pomona, Nuevo Leon                        | S         | 24° 59'   | 99° 12'    | !           | Mar. 1979    | Rio San Juan                              | S. A. R. H.                  |
| La Popa, Nuevo Leon                          | S         | 26° 10'   | 100° 50'   | 3,230       | # 1958       | Rio San Juan                              | S. A. R. H.                  |
| La Trasquila, Chihuahua                      | S         | 29° 08'   | 107° 08'   | !           | # 1962       | Adjacent to Rio Conchos                   | S. A. R. H.                  |
| Laguna de Salinillas, Nuevo Leon             | S         | 27° 26'   | 100° 23'   | 750         | # 1940       | Rio Salado                                | S. A. R. H.                  |
| Laguna de Sanchez, Nuevo Leon                | R         | 25° 22'   | 100° 17'   | 6,500       | Apr. 1941    | Rio San Juan                              | S. A. R. H.                  |
| Lampazos, Nuevo Leon                         | S         | 27° 02'   | 100° 30'   | 1,120       | # 1958       | Rio Salado                                | S. A. R. H.                  |

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|--|--------------|---------------|----------------|----------------|-----------------|--------------------------------------|---------------------------------|
| Las Burras, Chihuahua                    | S            | 28° 31'       | 105° 26'       | 3,590          | July 1949       | Rio Conchos                          | S. A. R. H.                     |
| Las Comitas, Nuevo Leon                  | S            | 25° 30'       | 100° 24'       | 1,670          | # 1940          | Rio San Juan                         | S. A. R. H.                     |
| Las Enramadas, Nuevo Leon                | S            | 25° 30'       | 99° 31'        | 730            | #Sept. 1926     | Rio San Juan                         | S. A. R. H.                     |
| Las Tortillas, Tamaulipas                | C            | 26° 50'       | 99° 34'        | 360            | #May 1961       | Rio Salado                           | I. B. & W. C.                   |
| Las Virgenes, Chihuahua                  | S            | 28° 10'       | 105° 38'       | 4,070          | # 1943          | Rio Conchos                          | S. A. R. H.                     |
| Linares, Nuevo Leon                      | R            | 24° 52'       | 99° 34'        | 1,180          | # 1900          | Adjacent to Rio San Juan             | S. A. R. H.                     |
| Los Barriles, Chihuahua                  | S            | 30° 55'       | 105° 45'       | 4,860          | July 1958       | El Paso - Ft. Quitman                | I. B. & W. C.                   |
| Los Herrera (La Tableta),<br>Nuevo Leon  | R            | 25° 54'       | 99° 24'        | 820            | #Sept. 1939     | Rio San Juan                         | S. A. R. H.                     |
| Los Ramones, Nuevo Leon                  | R            | 25° 42'       | 99° 38'        | 260            | #Sept. 1939     | Rio San Juan                         | S. A. R. H.                     |
| Luis L. Leon, Chihuahua                  | S            | 31° 05'       | 105° 38'       | 3,460          | 1958            | El Paso - Fort Quitman               | I. B. & W. C.                   |
| Maclovio Herrera<br>(Palomir), Chihuahua | S            | 29° 04'       | 105° 09'       | 3,220          | # 1924          | Rio Conchos                          | Meteor. Service<br>of Mexico    |
| Madero (Los Aldama),<br>Nuevo Leon       | S            | 26° 02'       | 99° 12'        | !              | #May 1970       | Rio San Juan                         | S. A. R. H.                     |
| Majjomia, Chihuahua                      | S            | 28° 55'       | 104° 21'       | 4,270          | Aug. 1955       | Rio Conchos                          | Meteor. Service<br>of Chihuahua |
| Majalca, Chihuahua                       | S            | 28° 53'       | 106° 21'       | 6,860          | June 1963       | Rio Conchos                          | Meteor. Service<br>of Mexico    |
| Manuel Benavides,<br>Chihuahua           | S            | 29° 06'       | 103° 54'       | !              | #Oct. 1961      | Above Rio Conchos -<br>Johnson Ranch | Meteor. Service<br>of Chihuahua |
| Matamoros, Tamaulipas                    | S            | 25° 52'       | 97° 30'        | 33             | # 1958          | Lower Rio Grande Valley              | Meteor. Service<br>of Mexico    |
| Meoqui, Chihuahua                        | S            | 28° 16'       | 105° 29'       | 3,790          | 1961            | Rio Conchos                          | Meteor. Service<br>of Chihuahua |
| Miguel Aleman, Tamaulipas                | S            | 26° 24'       | 99° 02'        | 180            | 1964            | Falcon Dam -<br>Rio Grande City      | S. A. R. H.                     |
| Mimbres, Nuevo Leon                      | S            | 24° 58'       | 100° 16'       | !              | # 1958          | Rio San Juan                         | S. A. R. H.                     |
| Mina, Nuevo Leon                         | S            | 26° 00'       | 100° 32'       | !              | # 1958          | Rio San Juan                         | S. A. R. H.                     |
| Montemorelos, Nuevo Leon                 | S            | 25° 12'       | 99° 50'        | 1,420          | #Aug. 1904      | Rio San Juan                         | S. A. R. H.                     |
| Monterrey, Nuevo Leon                    | S            | 25° 40'       | 100° 18'       | 1,740          | # 1896          | Rio San Juan                         | S. A. R. H.                     |
| Muzquiz, Coahuila                        | S            | 27° 53'       | 101° 31'       | 1,650          | # 1923          | Rio Salado                           | S. A. R. H.                     |
| Nonoava, Chihuahua                       | S            | 27° 29'       | 106° 44'       | !              | # 1963          | Rio Conchos                          | Meteor. Service<br>of Chihuahua |
| Nueva Cd. Guerrero,<br>Tamaulipas        | S            | 26° 34'       | 99° 14'        | 350            | #May 1954       | Laredo - Falcon Dam                  | I. B. & W. C.                   |
| Nuevo Laredo, Tamaulipas                 | S            | 27° 30'       | 99° 30'        | 430            | 1950            | Eagle Pass - Laredo                  | I. B. & W. C.                   |
| Nuevo Laredo, Tamaulipas                 | S            | 27° 30'       | 99° 30'        | 430            | # 1909          | Eagle Pass - Laredo                  | Meteor. Service<br>of Mexico    |
| Nuevo Laredo Km. 26, SSW,<br>Tamaulipas  | C            | 27° 17'       | 99° 37'        | !              | #Apr. 1961      | Laredo - Falcon Dam                  | I. B. & W. C.                   |
| Nuevo Laredo (Sur),<br>Tamaulipas        | S            | 27° 26'       | 99° 32'        | 413            | #May 1975       | Laredo - Falcon Dam                  | I. B. & W. C.                   |
| Ocampo, Coahuila                         | S            | 27° 19'       | 102° 24'       | 3,770          | #May 1960       | Adjacent to Rio Salado               | S. A. R. H.                     |
| Ojinaga, Chihuahua                       | S            | 29° 34'       | 104° 24'       | 2,590          | #Apr. 1954      | Rio Conchos                          | I. B. & W. C.                   |
| Ojinaga, Chihuahua                       | S            | 29° 34'       | 104° 25'       | 2,620          | #Nov. 1966      | Rio Conchos                          | Meteor. Service<br>of Mexico    |
| Ojo Caliente, Chihuahua                  | S            | 27° 41'       | 105° 12'       | 4,010          | 1942            | Rio Conchos                          | S. A. R. H.                     |
| Ojo de Agua (Sabinas),<br>Nuevo Leon     | S            | 26° 30'       | 100° 11'       | !              | 1980            | Rio Salado                           | S. A. R. H.                     |
| Pajonal, Nuevo Leon                      | S            | 25° 29'       | 100° 23'       | 5,020          | 1958            | Rio San Juan                         | S. A. R. H.                     |
| Palestina, Coahuila                      | S            | 29° 09'       | 100° 59'       | 1,080          | # 1931          | Rio San Diego                        | S. A. R. H.                     |
| Paras, Nuevo Leon                        | S            | 26° 30'       | 99° 31'        | 541            | # 1958          | Rio Alamo                            | S. A. R. H.                     |
| Parral, Chihuahua                        | S            | 26° 56'       | 105° 39'       | 5,740          | # 1903          | Rio Conchos                          | Meteor. Service<br>of Mexico    |
| Parras, Coahuila                         | S            | 25° 27'       | 102° 10'       | 5,510          | 1958            | Adjacent to Rio San Juan             | S. A. R. H.                     |
| Parrita, Chihuahua                       | S            | 29° 25'       | 106° 29'       | !              | # 1958          | Adjacent to Rio Conchos              | S. A. R. H.                     |
| Piedras Negras, Coahuila                 | S            | 28° 43'       | 100° 31'       | 820            | # 1951          | Amistad Dam - Eagle Pass             | Meteor. Service<br>of Mexico    |
| Porvenir, Chihuahua                      | S            | 31° 14'       | 105° 52'       | 3,530          | 1958            | El Paso - Ft. Quitman                | I. B. & W. C.                   |
| Posta Zootecnica,<br>Chihuahua           | S            | 28° 41'       | 106° 04'       | 4,740          | # 1957          | Rio Conchos                          | Meteor. Service<br>of Mexico    |
| Potosi, Nuevo Leon                       | S            | 24° 51'       | 100° 19'       | 6,260          | # 1958          | Adjacent to Rio San Juan             | S. A. R. H.                     |
| Praxedis G. Guerrero,<br>Chihuahua       | S            | 31° 22'       | 106° 00'       | 3,560          | # 1958          | El Paso - Ft. Quitman                | I. B. & W. C.                   |
| Presa Anzalduas, Tamps.                  | V            | 26° 08'       | 98° 20'        | 105            | Apr. 1960       | Lower Rio Grande Valley              | I. B. & W. C.                   |
| Presa Cabeceras, Coahuila                | S            | 29° 02'       | 101° 05'       | !              | # 1964          | Amistad Dam - Eagle Pass             | S. A. R. H.                     |
| Presa Carranza, Coahuila                 | S            | 27° 31'       | 100° 37'       | 790            | #June 1927      | Rio Salado                           | S. A. R. H.                     |
| Presa Centenario, Coah.                  | S            | 29° 13'       | 100° 57'       | !              | # 1964          | Arroyo Las Vacas                     | S. A. R. H.                     |
| Presa Chihuahua, Chih.                   | S            | 28° 34'       | 106° 10'       | 5,230          | Oct. 1961       | Rio Conchos                          | S. A. R. H.                     |
| Presa La Boca, Nuevo Leon                | S            | 25° 25'       | 100° 09'       | 1,460          | # 1923          | Rio San Juan                         | S. A. R. H.                     |
| Presa Luis L. Leon, Chih.                | S            | 28° 57'       | 105° 17'       | !              | Oct. 1964       | Rio Conchos                          | S. A. R. H.                     |
| Presa San Miguel, Coah.                  | S            | 29° 02'       | 100° 57'       | 1,000          | # 1964          | Rio San Diego                        | S. A. R. H.                     |
| Progreso, Coahuila                       | S            | 27° 25'       | 101° 00'       | 1,210          | #Feb. 1943      | Rio Salado                           | S. A. R. H.                     |
| Ramos Arizpe, Coahuila                   | S            | 25° 32'       | 100° 57'       | 4,590          | #Apr. 1907      | Rio San Juan                         | Meteor. Service<br>of Mexico    |
| Rancho Bonanza, Tamps.                   | S            | 26° 50'       | 99° 26'        | !              | 1973            | Laredo - Falcon Dam                  | Delfino Garcia P.               |
| Rancho La Chuparrosa,<br>Coahuila        | R            | 29° 30'       | 101° 15'       | 1,150          | # 1970          | Foster Ranch -<br>Amistad Dam        | I. B. & W. C.                   |

S Standard      C Cumulative      R Recording

R Recording

! Not available

# Some months or years missing

V Visual

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## In Mexico

| NAME OF STATION                         | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>(FT.) | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION                    | OBSERVER                     |
|---|--------------|---------------|----------------|----------------|-----------------|---|------------------------------|
| Rancho Las Espuelas,<br>Tamaulipas      | S            | 27° 07'       | 99° 27'        | !              | Nov. 1971       | Laredo - Falcon Dam                         | Delfino Garcia P.            |
| Rancho Vidrios, Tamps.                  | C            | 27° 35'       | 99° 37'        | 450            | #Sept. 1956     | Eagle Pass - Laredo                         | I. B. & W. C.                |
| Rancho San Diego, Coah.                 | S            | 28° 03'       | 100° 35'       | !              | May 1959        | Eagle Pass - Laredo                         | I. B. & W. C.                |
| Rancho San Rafael<br>Bustamante, Tamps. | C            | 26° 54'       | 99° 30'        | !              | Nov. 1967       | Rio Salado                                  | I. B. & W. C.                |
| Rayones, Nuevo Leon                     | S            | 25° 01'       | 100° 05'       | 1,970          | #Oct. 1926      | Rio San Juan                                | S. A. R. H.                  |
| Reata, Coahuila                         | S            | 25° 08'       | 101° 05'       | 3,070          | #July 1944      | Rio San Juan                                | S. A. R. H.                  |
| Repres Amistad, Coahuila                | R            | 29° 26'       | 101° 02'       | 918            | #June 1969      | Amistad Dam - Eagle Pass                    | I. B. & W. C.                |
| Retama, Tamaulipas                      | S            | 26° 02'       | 98° 03'        | 82             | #Oct. 1949      | Lower Rio Grande Valley                     | I. B. & W. C.                |
| Reynosa, Tamaulipas                     | R            | 26° 06'       | 98° 19'        | 130            | # 1941          | Lower Rio Grande Valley                     | S. A. R. H.                  |
| Reynosa Km. 22, SW,<br>Tamaulipas       | C            | 26° 00'       | 98° 30'        | !              | # 1962          | Lower Rio Grande Valley                     | I. B. & W. C.                |
| Rinconada, Nuevo Leon                   | S            | 25° 41'       | 100° 42'       | 4,790          | #Apr. 1944      | Rio San Juan                                | S. A. R. H.                  |
| Rio Bravo, Tamaulipas                   | S            | 25° 59'       | 98° 06'        | 85             | #Sept. 1950     | Lower Rio Grande Valley                     | S. A. R. H.                  |
| Rio Salado Carr. 85,<br>Nuevo Leon      | S            | 26° 53'       | 99° 49'        | 390            | #May 1958       | Rio Salado                                  | I. B. & W. C.                |
| Rio Salado Riberena,<br>Tamaulipas      | S            | 26° 48'       | 99° 25'        | 330            | July 1964       | Laredo - Falcon Dam                         | I. B. & W. C.                |
| Rusio, Nuevo Leon                       | S            | 24° 42'       | 100° 26'       | 6,570          | #June 1956      | Adjacent to Rio San Juan                    | S. A. R. H.                  |
| Sabinas, Coahuila                       | S            | 27° 51'       | 101° 07'       | 1,120          | #May 1922       | Rio Salado                                  | S. A. R. H.                  |
| Sabinas, Hidalgo, Nv. Leon              | S            | 26° 30'       | 100° 10'       | 1,030          | May 1958        | Rio Salado                                  | I. B. & W. C.                |
| Saltillo, Coahuila                      | S            | 25° 26'       | 101° 00'       | 5,280          | # 1886          | Rio San Juan                                | S. A. R. H.                  |
| Samalayuca, Chihuahua                   | S            | 31° 21'       | 106° 28'       | 4,180          | 1958            | El Paso - Ft. Quitman                       | Meteor. Service<br>of Mexico |
| San Agustin, Chihuahua                  | S            | 31° 31'       | 106° 15'       | 3,650          | 1958            | El Paso - Ft. Quitman                       | I. B. & W. C.                |
| San Antonio, Durango                    | S            | 26° 25'       | 105° 21'       | 5,430          | # 1943          | Rio Conchos                                 | S. A. R. H.                  |
| San Buenaventura, Coahuila              | S            | 27° 04'       | 101° 33'       | 2,300          | #Dec. 1926      | Rio Salado                                  | Meteor. Service<br>of Mexico |
| San Carlos, Coahuila                    | S            | 29° 01'       | 100° 54'       | 980            | # 1961          | Rio San Diego                               | F. Jakubesch                 |
| San Diego, Nuevo Leon                   | S            | 25° 14'       | 99° 15'        | !              | #Feb. 1978      | Rio San Juan                                | S. A. R. H.                  |
| San Fernando, Coahuila                  | S            | 29° 25'       | 101° 43'       | !              | Aug. 1961       | Foster Ranch -<br>Amistad Dam               | I. B. & W. C.                |
| San Ignacio, Tamaulipas                 | C            | 27° 04'       | 99° 28'        | !              | # 1964          | Laredo - Falcon Dam                         | I. B. & W. C.                |
| San Javier, Nuevo Leon                  | C            | 26° 16'       | 99° 25'        | !              | 1962            | Rio Alamo                                   | I. B. & W. C.                |
| San Juan, Nuevo Leon                    | S            | 25° 33'       | 99° 50'        | 880            | #Nov. 1943      | Rio San Juan                                | S. A. R. H.                  |
| San Juan de la Vaqueria,<br>Coahuila    | S            | 25° 15'       | 101° 13'       | !              | # 1980          | Rio San Juan                                | S. A. R. H.                  |
| San Juanito, Chihuahua                  | S            | 27° 58'       | 107° 36'       | !              | # 1959          | Adjacent to Rio Conchos                     | Meteor. Service<br>of Mexico |
| San Lorenzo, Chihuahua                  | S            | 28° 10'       | 106° 29'       | 3,770          | # 1961          | Rio Conchos                                 | S. A. R. H.                  |
| San Nicolas, Nuevo Leon                 | S            | 27° 26'       | 100° 02'       | !              | # 1978          | Rio San Juan                                | S. A. R. H.                  |
| San Rafael, Nuevo Leon                  | S            | 25° 02'       | 100° 33'       | !              | # 1959          | Adjacent to Rio San Juan                    | S. A. R. H.                  |
| Santa Catarina, Nv. Leon                | R            | 25° 40'       | 100° 29'       | 2,230          | #Oct. 1937      | Rio San Juan                                | S. A. R. H.                  |
| Santa Rosa, Coahuila                    | V            | 29° 38'       | 101° 28'       | !              | # 1958          | Foster Ranch -<br>Amistad Dam               | Ind. Co-operator             |
| Sierra Mojada, Coahuila                 | S            | 27° 17'       | 103° 42'       | 4,120          | # 1897          | Adjacent to Johnson<br>Ranch - Foster Ranch | S. A. R. H.                  |
| Siquirichic, Chihuahua                  | S            | 27° 09'       | 107° 12'       | 7,610          | #July 1956      | Adjacent to Rio Conchos                     | Meteor. Service<br>of Mexico |
| Tacubaya, Chihuahua                     | S            | 28° 08'       | 104° 23'       | 5,150          | #July 1962      | Adjacent to Rio Conchos                     | Meteor. Service<br>of Mexico |
| Tepehuaje, Nuevo Leon                   | S            | 25° 32'       | 100° 15'       | !              | #June 1979      | Rio San Juan                                | S. A. R. H.                  |
| Topo Chico, Nuevo Leon                  | R            | 25° 44'       | 100° 20'       | 1,640          | #Aug. 1939      | Rio San Juan                                | S. A. R. H.                  |
| Tunel San Francisco,<br>Nuevo Leon      | S            | 25° 25'       | 100° 10'       | !              | # 1958          | Rio San Juan                                | S. A. R. H.                  |
| Una de Gato, Nuevo Leon                 | S            | 25° 58'       | 99° 41'        | !              | 1979            | Rio San Juan                                | S. A. R. H.                  |
| Vado de Cedillos, Chih.                 | S            | 31° 13'       | 105° 48'       | 3,500          | Apr. 1958       | El Paso - Ft. Quitman                       | I. B. & W. C.                |
| Valadeces, Tamaulipas                   | S            | 26° 14'       | 98° 40'        | !              | 1964            | Lower Rio Grande Valley                     | S. A. R. H.                  |
| Vallecillo, Nuevo Leon                  | S            | 26° 40'       | 99° 59'        | 900            | #June 1958      | Rio Salado                                  | S. A. R. H.                  |
| Valle Hermoso, Tamaulipas               | S            | 25° 41'       | 97° 48'        | 52             | #June 1949      | Lower Rio Grande Valley                     | S. A. R. H.                  |
| Vaqueria, Nuevo Leon                    | S            | 25° 08'       | 99° 04'        | !              | #Mar. 1979      | Rio San Juan                                | S. A. R. H.                  |
| Victoria, Chihuahua                     | S            | 27° 58'       | 104° 33'       | 4,810          | June 1963       | Adjacent to Rio Conchos                     | Meteor. Service<br>of Mexico |
| Villa Aldama, Chihuahua                 | S            | 28° 50'       | 105° 55'       | 4,140          | 1961            | Rio Conchos                                 | Meteor. Service<br>of Mexico |
| Villaldama, Nuevo Leon                  | S            | 26° 30'       | 100° 25'       | 1,540          | #Apr. 1979      | Rio Salado                                  | Meteor. Service<br>of Mexico |
| Villa Allende, Nuevo Leon               | S            | 25° 17'       | 100° 01'       | 2,210          | #Nov. 1938      | Rio San Juan                                | S. A. R. H.                  |
| Villa Coronado, Chihuahua               | S            | 26° 44'       | 105° 08'       | 4,790          | #Aug. 1964      | Rio Conchos                                 | S. A. R. H.                  |
| Villa Hidalgo, Coahuila                 | S            | 27° 47'       | 99° 52'        | 660            | 1951            | Eagle Pass - Laredo                         | I. B. & W. C.                |
| Villalba, Chihuahua                     | S            | 27° 59'       | 105° 47'       | 3,940          | Oct. 1940       | Rio Conchos                                 | S. A. R. H.                  |
| Zaragoza, Coahuila                      | S            | 28° 29'       | 100° 55'       | 1,210          | #Aug. 1977      | Eagle Pass - Laredo                         | S. A. R. H.                  |

R Recording

C Cumulative

S Standard

V Visual

! Not available

# Some months or years missing

**EVAPORATION IN THE RIO GRANDE BASIN  
IN THE UNITED STATES**

In Inches

Tabulated below are records of evaporation observed at eight stations in Texas operated by the United States Section of the Commission from Presidio to Brownsville. At all stations, the exposure to wind was uniform and relatively unimpeded. The sites were kept cleared of all high brush and trees within 150 feet, and all brush, tall weeds, and other obstructions within 100 feet of the fenced enclosures. Within the enclosures all vegetation has been eradicated or kept trimmed to within 3 inches of the ground surface. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Rio Grande Watershed," pages 138 through 140 in this bulletin.

Records were obtained by means of:

1. Standard National Weather Service pan. A circular pan, 4 feet in diameter and 10 inches deep, made of 22-gage galvanized iron, is set on a wooden platform with the rim of the pan 16 inches above the ground. The water level is maintained between 2 and 3 inches below the rim of the pan and is measured with a micrometer gage. This type of pan was in operation at Amistad Dam and Falcon Dam.

2. A circular pan, 2 feet in diameter and 36 inches deep, made of 22-gage galvanized iron, is set in the ground with the rim of the pan 3 inches above the ground surface and the top covered with a circular screen of No. 4 (1/4" mesh) galvanized hardware cloth. The water level is maintained between 2.5 and 3.5 inches below the rim of the pan. This type of pan was in operation at Falcon Dam. This same type of pan, equipped with an automatic feed tank that maintains the water at a level 3 inches below the rim of the pan, was in operation at Martin King Ranch and Eagle Pass.

3. An evaporometer, developed by the United States Section of the Commission and calibrated against a 2-foot pan described above, was in operation at Presidio, Johnson Ranch, and at a site 7 miles east of Brownsville.

| Month | Presidio |                   | Johnson Ranch |                   | Martin King Ranch |                    | Long Ranch |                           |
|-------|----------|-------------------|---------------|-------------------|-------------------|--------------------|------------|---------------------------|
|       | 1981     | Average 1950-1981 | 1981          | Average 1950-1981 | 1981              | #Average 1956-1981 | 1981       | Average October 1971-1981 |
| Jan.  | 2.06     | 3.74              | 1.52          | 3.18              | 3.14              | 3.03               | 2.55       | 2.25                      |
| Feb.  | 4.00     | 5.07              | 4.45          | 4.70              | 2.67              | 3.57               | 2.24       | 2.77                      |
| Mar.  | 5.75     | 7.99              | 6.29          | 8.03              | 5.70              | 6.12               | 3.99       | 4.60                      |
| Apr.  | 7.03     | 9.83              | 6.39          | 10.10             | 5.66              | 7.34               | 4.46       | 5.41                      |
| May   | 7.42     | 11.45             | 9.23          | 11.57             | 6.74              | 8.09               | 5.35       | 5.46                      |
| June  | 8.85     | 12.52             | 9.34          | 11.95             | 7.87              | 9.99               | 4.91       | 7.28                      |
| July  | 9.37     | 11.76             | 11.43         | 11.86             | 10.52             | 11.02              | 7.95       | 8.34                      |
| Aug.  | 6.29     | 10.78             | 7.89          | 10.76             | 9.70              | 10.45              | 6.09       | 7.36                      |
| Sept. | 6.29     | 9.02              | 7.15          | 8.61              | 10.01             | 7.59               | 5.72       | 6.04                      |
| Oct.  | 3.43     | 7.18              | 4.10          | 6.76              | 7.84              | 5.56               | 3.94       | 3.87                      |
| Nov.  | 3.25     | 4.79              | 3.26          | 4.28              | 4.43              | 3.83               | 3.35       | 2.93                      |
| Dec.  | 2.47     | 3.55              | 3.61          | 3.22              | 3.41              | 3.09               | 2.39       | 2.15                      |
| Total | 66.21    | 97.68             | 74.66         | 95.02             | 77.69             | 79.68              | 52.94      | 58.46                     |

| Month | Amistad Dam |                         | Eagle Pass |                    | Falcon Dam |                    |       |                    | Brownsville |                    |
|-------|-------------|-------------------------|------------|--------------------|------------|--------------------|-------|--------------------|-------------|--------------------|
|       | 1981        | Average March 1963-1981 | 1981       | #Average 1964-1981 | 1981       | #Average 1950-1981 | 1981  | #Average 1956-1981 | 1981        | #Average 1958-1981 |
| Jan.  | 3.29        | 3.83                    | 2.53       | 3.16               | 2.35       | 3.44               | 2.94  | 3.93               | 3.72        | 2.69               |
| Feb.  | 3.45        | 4.80                    | 2.34       | 3.54               | 2.75       | 4.28               | 3.39  | 5.23               | 4.64        | 3.46               |
| Mar.  | 6.54        | 8.36                    | 4.52       | 5.63               | 4.69       | 6.52               | 6.24  | 8.30               | 5.99        | 4.66               |
| Apr.  | 6.51        | 9.95                    | 7.43       | 6.95               | 5.55       | 7.80               | 7.08  | 10.24              | 6.91        | 5.55               |
| May   | 9.37        | 10.63                   | 6.86       | 7.17               | 5.63       | 9.08               | 8.93  | 11.75              | 7.53        | 5.53               |
| June  | 9.27        | 13.00                   | 9.68       | 9.80               | 6.19       | 10.73              | 9.05  | 13.39              | 7.86        | 6.23               |
| July  | 12.83       | 14.89                   | 9.03       | 10.98              | 8.55       | 12.41              | 11.46 | 15.28              | 9.00        | 6.88               |
| Aug.  | 12.14       | 13.26                   | 9.67       | 9.86               | 7.86       | 11.14              | 10.36 | 13.89              | 8.97        | 6.58               |
| Sept. | 10.54       | 9.76                    | 7.37       | 7.34               | 5.48       | 7.83               | 8.06  | 9.73               | 8.67        | 5.28               |
| Oct.  | 6.76        | 7.27                    | 6.09       | 6.10               | 5.46       | 6.36               | 7.00  | 7.39               | 7.82        | 4.51               |
| Nov.  | 5.42        | 4.78                    | 4.98       | 4.00               | 3.85       | 4.74               | 4.85  | 5.27               | 5.63        | 3.52               |
| Dec.  | 4.21        | 3.75                    | 4.42       | 3.45               | 3.69       | 3.65               | 3.83  | 3.90               | 4.28        | 2.90               |
| Total | 90.33       | 104.28                  | 74.92      | 77.98              | 62.05      | 87.98              | 83.19 | 108.30             | 81.02       | 57.79              |

# Some months missing

**EVAPORATION IN THE RIO GRANDE BASIN  
IN MEXICO  
In Inches**

Tabulated below are records of evaporation observed at ten stations operated and maintained by the Mexican Section of the Commission. Nine stations are along the Rio Grande from Cd. Juarez, Chihuahua to Retamal, Tamaulipas, and one is located on the Rio Conchos near Ojinaga, Chihuahua. At all stations, except Ojinaga, the sites were kept cleared of all high brush and trees within 150 feet, and of all brush and tall weeds within 100 feet of the fenced enclosures. There are several large trees at the Ojinaga station. The corrugated iron gage well, 42 inches in diameter, and one A-frame of the cableway of the Rio Conchos stream gaging station are in the north end of the enclosure. Inside the enclosures, all vegetation has been eradicated or kept trimmed to within 3 inches of the ground surface. Except for a water barrel and a thermometer shelter in the northeast and northwest corners of the enclosures, the exposure to wind was uniform and relatively unimpeded. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Rio Grande Watershed," pages 141 through 144 in this bulletin.

The type of pan used at all these stations was a standard National Weather Service-type pan, 4 feet in diameter and 10 inches deep, made of 22-gage galvanized iron, set on a wooden platform with the rim of the pan 16 inches above the ground. The water level was maintained between 2 and 3 inches below the rim of the pan and was measured with a micrometer gage.

Data for other evaporation stations in the Rio Grande basin in Mexico, which were operated by various Mexican agencies, are available in Water Bulletin No. 51 published by the Mexican Section of the Commission.

| Month | Cd. Juarez,<br>Chihuahua |                        | Ojinaga,<br>Chihuahua |                          | Cd. Acuna,<br>Coahuila |                        | La Amistad,<br>Coahuila |                          | Jimenez,<br>Coahuila |                        |
|-------|--------------------------|------------------------|-----------------------|--------------------------|------------------------|------------------------|-------------------------|--------------------------|----------------------|------------------------|
|       | 1981                     | # Average<br>1969-1981 | 1981                  | # Avg. Apr.<br>1954-1981 | 1981                   | # Average<br>1951-1981 | 1981                    | # Avg. Feb.<br>1977-1981 | 1981                 | # Average<br>1951-1981 |
| Jan.  | 2.20                     | 3.13                   | 2.72                  | 3.66                     | 2.60                   | 3.39                   | 3.54                    | 3.32                     | 3.23                 | 3.60                   |
| Feb.  | 4.33                     | 4.65                   | 4.09                  | 5.07                     | 2.76                   | 4.56                   | 3.46                    | 4.65                     | 3.27                 | 4.58                   |
| Mar.  | 6.65                     | 8.05                   | 7.52                  | 8.62                     | 6.18                   | 7.80                   | 7.56                    | 8.18                     | 7.52                 | 7.30                   |
| Apr.  | 8.66                     | 10.03                  | 8.19                  | 11.05                    | 4.96                   | 8.74                   | 6.69                    | 9.48                     | 6.18                 | 7.82                   |
| May   | 11.14                    | 11.31                  | 9.92                  | 13.16                    | 7.91                   | 9.66                   | 9.53                    | 9.61                     | 7.91                 | 8.88                   |
| June  | 11.65                    | 12.48                  | 10.63                 | 13.70                    | 8.78                   | 11.59                  | 10.04                   | 12.44                    | 8.78                 | 10.81                  |
| July  | 11.57                    | 10.88                  | 11.77                 | 13.05                    | 11.57                  | 13.13                  | 13.78                   | 15.33                    | 12.80                | 12.19                  |
| Aug.  | 8.74                     | 9.83                   | 8.70                  | 11.11                    | 10.24                  | 11.82                  | 12.72                   | 13.74                    | 12.56                | 11.01                  |
| Sept. | 6.97                     | 7.94                   | 8.11                  | 8.77                     | 8.94                   | 8.59                   | 10.51                   | 10.39                    | 9.25                 | 7.97                   |
| Oct.  | 6.34                     | 6.33                   | 4.53                  | 6.97                     | 5.63                   | 6.11                   | 7.20                    | 8.00                     | 7.48                 | 5.76                   |
| Nov.  | 4.92                     | 4.23                   | 3.86                  | 4.37                     | 4.13                   | 3.88                   | 5.67                    | 5.01                     | 6.61                 | 3.84                   |
| Dec.  | 3.98                     | 3.47                   | 3.15                  | 3.36                     | 2.87                   | 3.11                   | 4.02                    | 3.98                     | 4.33                 | 3.23                   |
| Total | 87.15                    | 92.33                  | 83.19                 | 102.89                   | 76.57                  | 92.38                  | 94.72                   | 104.13                   | 89.92                | 86.99                  |

| Month | Hidalgo,<br>Coahuila |                        | Nuevo Laredo,<br>Tamaulipas |                        | Nueva Cd. Guerrero,<br>Tamaulipas |                          | Cd. Mier,<br>Tamaulipas |                          | Retamal,<br>Tamaulipas |                        |
|-------|----------------------|------------------------|-----------------------------|------------------------|-----------------------------------|--------------------------|-------------------------|--------------------------|------------------------|------------------------|
|       | 1981                 | # Average<br>1951-1981 | 1981                        | Avg. Aug.<br>1964-1981 | 1981                              | # Avg. June<br>1954-1981 | 1981                    | # Avg. Oct.<br>1955-1981 | 1981                   | # Average<br>1951-1981 |
| Jan.  | 2.48                 | 3.82                   | 3.94                        | 4.08                   | 2.28                              | 3.37                     | 2.64                    | 3.60                     | 2.87                   | 4.01                   |
| Feb.  | 2.95                 | 5.08                   | 4.41                        | 5.19                   | 3.11                              | 4.27                     | 3.43                    | 4.82                     | 3.39                   | 4.60                   |
| Mar.  | 5.51                 | 7.77                   | 8.74                        | 8.52                   | 6.14                              | 7.16                     | 6.10                    | 7.85                     | 5.87                   | 6.55                   |
| Apr.  | 5.51                 | 9.61                   | 9.65                        | 10.28                  | 6.22                              | 8.81                     | 6.97                    | 9.52                     | 6.34                   | 7.83                   |
| May   | 7.20                 | 11.47                  | 12.99                       | 13.51                  | 7.80                              | 10.20                    | 10.43                   | 12.37                    | 6.93                   | 9.00                   |
| June  | 7.48                 | 13.16                  | 12.95                       | 14.84                  | 11.61                             | 13.15                    | 12.91                   | 14.14                    | 8.39                   | 9.91                   |
| July  | 8.74                 | 14.77                  | 16.22                       | 14.84                  | 8.74                              | 11.52                    | 10.43                   | 12.37                    | 7.72                   | 9.56                   |
| Aug.  | 9.09                 | 13.42                  | 15.39                       | 13.48                  | 10.63                             | 12.05                    | 11.57                   | 12.90                    | 7.64                   | 7.34                   |
| Sept. | 6.42                 | 9.65                   | 12.01                       | 10.15                  | 8.39                              | 8.75                     | 8.19                    | 9.48                     | 7.40                   | 6.06                   |
| Oct.  | 5.08                 | 7.23                   | 9.72                        | 7.85                   | 6.54                              | 6.54                     | 7.36                    | 7.35                     | 4.61                   | 4.37                   |
| Nov.  | 4.06                 | 4.66                   | 7.01                        | 5.29                   | 4.49                              | 4.57                     | 4.84                    | 4.84                     | 4.21                   | 3.84                   |
| Dec.  | 2.68                 | 3.59                   | 5.63                        | 4.09                   | 3.39                              | 3.39                     | 4.02                    | 3.70                     |                        |                        |
| Total | 67.20                | 104.23                 | 118.66                      | 108.76                 | 79.34                             | 93.78                    | 87.99                   | 101.40                   | 73.28                  | 81.50                  |

# Some months missing

## TEMPERATURE, HUMIDITY, AND WIND

The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations. The mean monthly temperatures are averages of these daily maximum and minimum temperatures.

The mean monthly temperatures and relative humidities shown for stations in the United States were integrated from continuous records of hygrothermographs, housed in louvered shelters, with the sensing elements of the instruments 16 inches above the ground and 9 feet southwest of either a 2 or 4-foot diameter evaporation pan. The maximum and minimum temperatures shown below are the extreme temperatures for the month as recorded on the charts except for Falcon Dam and Amistad Dam, where the readings are based on daily maximum and minimum thermometer observations.

Monthly mean wind velocities are based on the total miles of wind movement indicated by a standard 3-cup anemometer installed and operated according to specifications for a Class A National Weather Service evaporation station.

### Temperature - Degrees Fahrenheit

#### In United States

| Month  | Amistad Dam, Texas |                                |      |      | Eagle Pass, Texas |                       |      |      | Falcon Dam, Texas |                                |      |      |
|--------|--------------------|--------------------------------|------|------|-------------------|-----------------------|------|------|-------------------|--------------------------------|------|------|
|        | Mean<br>1981       | #Average<br>March<br>1963-1981 | 1981 |      | Mean<br>1981      | #Average<br>1964-1981 | 1981 |      | Mean<br>1981      | #Average<br>#July<br>1950-1981 | 1981 |      |
|        |                    |                                | Max. | Min. |                   |                       | Max. | Min. |                   |                                | Max. | Min. |
| Jan.   | 51.5               | 49.9                           | 78   | 30   | 51.7              | 51.2                  | 80   | 32   | 47.0              | 55.4                           | 83   | 32   |
| Feb.   | 54.6               | 53.4                           | 83   | 20   | 55.3              | 55.3                  | 83   | 23   | 49.2              | 59.6                           | 86   | 30   |
| Mar.   | 61.1               | 62.5                           | 89   | 42   | 62.9              | 64.3                  | 92   | 38   | 57.9              | 66.9                           | 91   | 44   |
| Apr.   | 70.3               | 71.2                           | 88   | 49   | 72.4              | 72.9                  | 94   | 51   | 67.8              | 74.9                           | 97   | 51   |
| May    | 74.9               | 71.2                           | 96   | 50   | 75.6              | 77.5                  | 98   | 54   | 69.8              | 79.7                           | 100  | 59   |
| June   | 78.7               | 82.0                           | 98   | 61   | 79.1              | 83.0                  | 96   | 64   | 76.0              | 83.5                           | 98   | 71   |
| July   | 83.2               | 84.7                           | 101  | 69   | 84.2              | 86.0                  | 100  | 70   | 78.4              | 85.4                           | 103  | 70   |
| Aug.   | 83.4               | 83.5                           | 101  | 69   | 84.6              | 84.9                  | 102  | 71   | 78.8              | 85.1                           | 103  | 71   |
| Sept.  | 78.9               | 78.5                           | 98   | 55   | 79.8              | 79.4                  | 99   | 56   | 75.5              | 80.7                           | 98   | 51   |
| Oct.   | 71.1               | 69.6                           | 94   | 45   | 72.9              | 70.2                  | 96   | 46   | 68.4              | 73.0                           | 98   | 48   |
| Nov.   | 62.7               | 59.7                           | 84   | 37   | 65.0              | 60.6                  | 88   | 36   | 63.2              | 63.5                           | 90   | 41   |
| Dec.   | 55.4               | 52.1                           | 77   | 23   | 54.5              | 54.0                  | 85   | 27   | 53.1              | 57.2                           | 90   | 35   |
| Yearly | 68.8               | 68.2                           | 101  | 20   | 69.8              | 69.9                  | 102  | 23   | 65.4              | 72.1                           | 103  | 30   |

#### In Mexico

| Month  | Cd. Juarez, Chihuahua |                               |      |      | Ojinaga, Chihuahua |                                |      |      | La Amistad, Coahuila |                       |      |      |
|--------|-----------------------|-------------------------------|------|------|--------------------|--------------------------------|------|------|----------------------|-----------------------|------|------|
|        | Mean<br>1981          | #Average<br>July<br>1960-1981 | 1981 |      | Mean<br>1981       | #Average<br>April<br>1954-1981 | 1981 |      | Mean<br>1981         | #Average<br>1977-1981 | 1981 |      |
|        |                       |                               | Max. | Min. |                    |                                | Max. | Min. |                      |                       | Max. | Min. |
| Jan.   | 48.2                  | 45.6                          | 72   | 27   | 50.0               | 49.3                           | 77   | 25   | 53.6                 | 46.4                  | 84   | 30   |
| Feb.   | 51.8                  | 50.1                          | 81   | 23   | 53.6               | 54.2                           | 84   | 25   | 55.4                 | 51.4                  | 82   | 21   |
| Mar.   | 55.4                  | 57.0                          | 84   | 32   | 59.0               | 61.5                           | 90   | 32   | 62.6                 | 61.5                  | 93   | 43   |
| Apr.   | 68.0                  | 64.6                          | 81   | 54   | 69.8               | 70.9                           | 95   | 41   | 71.6                 | 69.1                  | 93   | 50   |
| May    | 73.4                  | 73.3                          | 95   | 50   | 75.2               | 79.2                           | 104  | 52   | 78.8                 | 76.6                  | 100  | 61   |
| June   | 84.2                  | 81.7                          | 111  | 57   | 86.0               | 85.4                           | 113  | 57   | 82.4                 | 83.1                  | 104  | 64   |
| July   | 84.2                  | 83.1                          | 104  | 68   | 87.8               | 85.9                           | 109  | 66   | 86.0                 | 87.1                  | 104  | 72   |
| Aug.   | 78.8                  | 80.7                          | 102  | 63   | 82.4               | 84.1                           | 108  | 64   | 87.8                 | 86.0                  | 108  | 70   |
| Sept.  | 75.2                  | 75.1                          | 95   | 55   | 80.6               | 76.6                           | 100  | 55   | 84.2                 | 82.0                  | 104  | 54   |
| Oct.   | 64.4                  | 64.8                          | 86   | 37   | 69.8               | 70.1                           | 95   | 39   | 73.4                 | 71.2                  | 100  | 46   |
| Nov.   | 57.2                  | 53.0                          | 82   | 34   | 59.0               | 57.9                           | 86   | 32   | 66.2                 | 61.5                  | 86   | 43   |
| Dec.   | 50.0                  | 46.7                          | 77   | 23   | 53.6               | 50.8                           | 82   | 25   | 55.4                 | 52.5                  | 82   | 32   |
| Yearly | 65.9                  | 64.6                          | 111  | 23   | 68.9               | 68.8                           | 113  | 25   | 71.4                 | 69.0                  | 108  | 21   |

| Month  | Cd. Acuna, Coahuila |                                |      |      | Jimenez, Coahuila |                                |      |      | El Remolino, Coahuila |                              |      |      |
|--------|---------------------|--------------------------------|------|------|-------------------|--------------------------------|------|------|-----------------------|------------------------------|------|------|
|        | Mean<br>1981        | #Average<br>April<br>1951-1981 | 1981 |      | Mean<br>1981      | #Average<br>March<br>1951-1981 | 1981 |      | Mean<br>1981          | Average<br>June<br>1958-1981 | 1981 |      |
|        |                     |                                | Max. | Min. |                   |                                | Max. | Min. |                       |                              | Max. | Min. |
| Jan.   | 50.0                | 49.1                           | 82   | 21   | 50.0              | 52.5                           | 77   | 32   | 57.2                  | 57.0                         | 90   | 27   |
| Feb.   | 51.8                | 54.3                           | 86   | 18   | 55.4              | 56.4                           | 88   | 25   | 60.8                  | 60.2                         | 88   | 36   |
| Mar.   | 60.8                | 63.0                           | 93   | 32   | 62.6              | 63.2                           | 91   | 41   | 75.2                  | 66.5                         | 102  | 37   |
| Apr.   | 69.8                | 71.7                           | 95   | 45   | 73.4              | 71.4                           | 102  | 50   | 77.0                  | 74.6                         | 108  | 41   |
| May    | 75.2                | 78.2                           | 104  | 50   | 77.0              | 77.3                           | 104  | 52   | 77.0                  | 78.8                         | 108  | 50   |
| June   | 80.6                | 84.3                           | 104  | 59   | 82.4              | 83.3                           | 102  | 64   | 80.6                  | 83.8                         | 108  | 52   |
| July   | 84.2                | 87.1                           | 104  | 66   | 86.0              | 85.7                           | 102  | 66   | 86.0                  | 85.8                         | 109  | 63   |
| Aug.   | 86.0                | 86.4                           | 106  | 64   | 87.8              | 85.2                           | 109  | 70   | 86.0                  | 85.2                         | 113  | 59   |
| Sept.  | 80.6                | 81.2                           | 106  | 48   | 84.2              | 80.4                           | 104  | 52   | 82.4                  | 81.8                         | 108  | 55   |
| Oct.   | 71.6                | 71.1                           | 99   | 39   | 75.2              | 71.6                           | 102  | 43   | 75.2                  | 74.1                         | 104  | 45   |
| Nov.   | 60.8                | 58.7                           | 90   | 25   | 64.4              | 60.8                           | 91   | 32   | 71.6                  | 68.0                         | 102  | 41   |
| Dec.   | 50.0                | 51.2                           | 79   | 21   | 57.2              | 54.0                           | 88   | 32   | 55.4                  | 60.5                         | 86   | 27   |
| Yearly | 68.4                | 69.7                           | 106  | 18   | 71.3              | 70.2                           | 109  | 25   | 73.7                  | 73.0                         | 113  | 27   |

# Some months missing

**TEMPERATURE, HUMIDITY, AND WIND****Temperature - Degrees Fahrenheit****In Mexico**

| Month  | Piedras Negras, Coahuila |                                |      |      | Guerrero, Coahuila |                       |      |      | Villa Hidalgo, Coahuila |                                 |      |      |
|--------|--------------------------|--------------------------------|------|------|--------------------|-----------------------|------|------|-------------------------|---------------------------------|------|------|
|        | Mean<br>1981             | #Average<br>April<br>1951-1981 | 1981 |      | Mean<br>1981       | #Average<br>1958-1981 | 1981 |      | Mean<br>1981            | #Average<br>August<br>1951-1981 | 1981 |      |
|        |                          |                                | Max. | Min. |                    |                       | Max. | Min. |                         |                                 | Max. | Min. |
| Jan.   | 51.8                     | 50.9                           | 86   | 32   | 55.4               | 51.9                  | 84   | 32   | 51.8                    | 52.8                            | 79   | 28   |
| Feb.   | 55.4                     | 55.7                           | 82   | 21   | 57.2               | 56.1                  | 91   | 28   | 53.6                    | 57.2                            | 84   | 25   |
| Mar.   | 64.4                     | 63.2                           | 93   | 43   | 66.2               | 66.3                  | 88   | 41   | 62.6                    | 65.4                            | 88   | 39   |
| Apr.   | 73.4                     | 72.0                           | 93   | 48   | 75.2               | 74.4                  | 95   | 54   | 73.4                    | 74.9                            | 91   | 45   |
| May    | 77.0                     | 77.7                           | 99   | 54   | 82.4               | 80.0                  | 104  | 59   | 78.8                    | 79.8                            | 102  | 55   |
| June   | 80.6                     | 83.8                           | 99   | 64   | 86.0               | 84.9                  | 104  | 68   | 80.6                    | 85.0                            | 104  | 64   |
| July   | 86.0                     | 86.5                           | 102  | 72   | 89.6               | 86.8                  | 104  | 77   | 82.4                    | 86.6                            | 99   | 66   |
| Aug.   | 86.0                     | 85.7                           | 102  | 70   | 91.4               | 86.6                  | 104  | 77   | 84.2                    | 86.7                            | 104  | 68   |
| Sept.  | 82.4                     | 80.1                           | 100  | 55   | 82.4               | 81.8                  | 102  | 54   | 75.2                    | 81.9                            | 97   | 45   |
| Oct.   | 73.4                     | 70.6                           | 99   | 46   | 77.0               | 72.1                  | 102  | 50   | 71.6                    | 73.3                            | 95   | 41   |
| Nov.   | 66.2                     | 59.5                           | 90   | 34   | 66.2               | 62.2                  | 95   | 34   | 64.4                    | 61.2                            | 88   | 36   |
| Dec.   | 55.4                     | 52.9                           | 84   | 25   | 57.2               | 55.2                  | 93   | 32   | 57.2                    | 55.7                            | 88   | 21   |
| Yearly | 71.0                     | 69.9                           | 102  | 21   | 73.8               | 71.5                  | 104  | 28   | 69.6                    | 71.7                            | 104  | 21   |

| Month  | Nuevo Laredo, Tamps., C.I.L.A. |                                |      |      | Nuevo Laredo, Tamps., M.S. of M. |                       |      |      | Sabinas Hidalgo, Nuevo Leon |                                 |      |      |
|--------|--------------------------------|--------------------------------|------|------|----------------------------------|-----------------------|------|------|-----------------------------|---------------------------------|------|------|
|        | Mean<br>1981                   | Average<br>August<br>1964-1981 | 1981 |      | Mean<br>1981                     | #Average<br>1945-1981 | 1981 |      | Mean<br>1981                | Average<br>October<br>1961-1981 | 1981 |      |
|        |                                |                                | Max. | Min. |                                  |                       | Max. | Min. |                             |                                 | Max. | Min. |
| Jan.   | 59.0                           | 55.2                           | 86   | 36   | 53.6                             | 55.5                  | 79   | 30   | 53.6                        | 56.2                            | 72   | 32   |
| Feb.   | 62.6                           | 59.7                           | 97   | 30   | 59.0                             | 60.8                  | 82   | 28   | 53.6                        | 59.5                            | 72   | 28   |
| Mar.   | 68.0                           | 69.3                           | 97   | 45   | 64.4                             | 67.7                  | 90   | 46   | 64.4                        | 67.6                            | 95   | 45   |
| Apr.   | 78.8                           | 77.5                           | 102  | 59   | 75.2                             | 75.4                  | 93   | 59   | 73.4                        | 75.1                            | 95   | 57   |
| May    | 82.4                           | 82.2                           | 111  | 59   | 78.8                             | 80.8                  | 102  | 59   | 77.0                        | 80.1                            | 99   | 61   |
| June   | 87.8                           | 86.3                           | 108  | 72   | 82.4                             | 88.4                  | 100  | 72   | 84.2                        | 84.4                            | 108  | 66   |
| July   | 89.6                           | 88.2                           | 104  | 70   | 96.8                             | 88.0                  | 100  | 70   | 78.8                        | 84.9                            | 104  | 59   |
| Aug.   | 89.6                           | 87.9                           | 108  | 73   | 87.8                             | 87.3                  | 104  | 73   | 84.2                        | 84.8                            | 100  | 68   |
| Sept.  | 86.0                           | 89.0                           | 104  | 59   | 86.0                             | 81.6                  | 100  | 73   | 82.4                        | 80.2                            | 97   | 68   |
| Oct.   | 80.6                           | 76.1                           | 109  | 50   | 75.2                             | 73.1                  | 97   | 48   | 75.2                        | 74.0                            | 100  | 48   |
| Nov.   | 71.6                           | 62.2                           | 95   | 41   | 66.2                             | 64.1                  | 77   | 54   | 57.2                        | 64.2                            | 82   | 39   |
| Dec.   | 60.8                           | 59.7                           | 97   | 32   | 60.8                             | 51.2                  | 84   | 32   | 64.4                        | 59.3                            | 95   | 34   |
| Yearly | 76.4                           | 74.0                           | 111  | 30   | 73.8                             | 72.8                  | 104  | 28   | 70.7                        | 72.5                            | 108  | 28   |

| Month  | Nueva Cd. Guerrero, Tamaulipas |                      |      |      | Cd. Mier, Tamaulipas |                                  |      |      | Retamal, Tamaulipas |                       |      |      |
|--------|--------------------------------|----------------------|------|------|----------------------|----------------------------------|------|------|---------------------|-----------------------|------|------|
|        | Mean<br>1981                   | Average<br>1958-1981 | 1981 |      | Mean<br>1981         | #Average<br>October<br>1955-1981 | 1981 |      | Mean<br>1981        | #Average<br>1951-1981 | 1981 |      |
|        |                                |                      | Max. | Min. |                      |                                  | Max. | Min. |                     |                       | Max. | Min. |
| Jan.   | 55.4                           | 55.2                 | 82   | 32   | 55.4                 | 55.1                             | 84   | 36   | 57.2                | 59.8                  | 84   | 36   |
| Feb.   | 59.0                           | 59.1                 | 84   | 32   | 59.0                 | 59.3                             | 88   | 34   | 62.6                | 62.5                  | 91   | 34   |
| Mar.   | 66.2                           | 67.2                 | 91   | 45   | 68.0                 | 67.6                             | 97   | 45   | 69.8                | 69.3                  | 93   | 46   |
| Apr.   | 77.0                           | 75.9                 | 97   | 57   | 78.8                 | 75.8                             | 100  | 50   | 78.8                | 76.2                  | 95   | 55   |
| May    | 80.6                           | 80.7                 | 106  | 59   | 82.4                 | 80.6                             | 108  | 59   | 80.6                | 79.9                  | 98   | 59   |
| June   | 84.2                           | 84.8                 | 104  | 70   | 86.0                 | 84.8                             | 104  | 68   | 87.8                | 83.6                  | 108  | 70   |
| July   | 86.0                           | 86.2                 | 102  | 72   | 87.8                 | 86.6                             | 106  | 72   | 87.8                | 85.1                  | 106  | 72   |
| Aug.   | 87.8                           | 86.2                 | 106  | 72   | 89.6                 | 86.4                             | 108  | 73   | 87.8                | 85.8                  | 108  | 59   |
| Sept.  | 86.0                           | 82.1                 | 102  | 63   | 84.2                 | 82.1                             | 102  | 64   | 84.2                | 82.8                  | 106  | 48   |
| Oct.   | 78.8                           | 74.8                 | 102  | 50   | 78.8                 | 74.6                             | 100  | 48   | 80.6                | 76.8                  | 100  | 52   |
| Nov.   | 71.6                           | 65.5                 | 93   | 45   | 69.8                 | 65.0                             | 93   | 39   | 73.4                | 67.9                  | 97   | 43   |
| Dec.   | 64.4                           | 58.0                 | 95   | 39   | 62.6                 | 58.2                             | 91   | 34   | 66.2                | 61.9                  | 102  | 36   |
| Yearly | 74.8                           | 73.0                 | 106  | 32   | 75.2                 | 73.0                             | 108  | 34   | 76.4                | 74.3                  | 108  | 34   |

# Some months missing

**TEMPERATURE, HUMIDITY, AND WIND****Mean Wind Speed – Miles Per Hour****In United States**

| Month  | Martin King Ranch, Texas |                   | Amistad Dam, Texas |                          | Eagle Pass, Texas |                             | Falcon Dam, Texas |                         |
|--------|--------------------------|-------------------|--------------------|--------------------------|-------------------|-----------------------------|-------------------|-------------------------|
|        | 1981                     | Average 1957-1981 | 1981               | #Average March 1963-1981 | 1981              | #Average December 1963-1981 | 1981              | #Average July 1950-1981 |
| Jan.   | 3.3                      | 3.8               | 2.1                | 3.2                      | 2.7               | 2.6                         | 1.2               | 3.7                     |
| Feb.   | 4.9                      | 4.6               | 3.2                | 3.7                      | 3.7               | 3.2                         | 2.7               | 4.3                     |
| Mar.   | 5.3                      | 6.0               | 3.3                | 4.5                      | 4.1               | 3.6                         | 3.1               | 4.7                     |
| Apr.   | 5.8                      | 6.2               | 3.4                | 4.5                      | 4.3               | 3.8                         | 3.2               | 5.4                     |
| May    | 5.2                      | 6.6               | 3.2                | 4.4                      | 3.9               | 3.7                         | 3.0               | 5.4                     |
| June   | 6.4                      | 7.1               | 3.7                | 4.8                      | 3.8               | 3.7                         | 2.5               | 5.6                     |
| July   | 6.8                      | 6.7               | 3.8                | 4.4                      | 4.6               | 3.7                         | 2.7               | 5.9                     |
| Aug.   | 5.1                      | 5.9               | 3.0                | 3.9                      | 3.9               | 3.3                         | 2.2               | 5.0                     |
| Sept.  | 5.7                      | 5.0               | 3.1                | 3.5                      | 3.0               | 2.8                         | 1.5               | 3.8                     |
| Oct.   | 4.9                      | 4.6               | 3.4                | 3.4                      | 4.2               | 2.5                         | 2.6               | 3.4                     |
| Nov.   | 3.4                      | 4.0               | 2.2                | 3.1                      | 3.1               | 2.3                         | 1.9               | 3.6                     |
| Dec.   | 3.0                      | 3.5               | 2.4                | 3.0                      | 3.0               | 2.3                         | 1.8               | 3.4                     |
| Yearly | 5.0                      | 5.3               | 3.1                | 3.9                      | 3.7               | 3.1                         | 2.4               | 4.5                     |

**Mean Relative Humidity - Percent****In United States**

| Month  | Amistad Dam, Texas |                         | Eagle Pass, Texas |                    | Falcon Dam, Texas |                         |
|--------|--------------------|-------------------------|-------------------|--------------------|-------------------|-------------------------|
|        | 1981               | Average March 1963-1981 | 1981              | #Average 1964-1981 | 1981              | Average #July 1950-1981 |
| Jan.   | 73.3               | 62.4                    | 65.3              | 65.4               | 83.5              | 67.2                    |
| Feb.   | 74.6               | 60.4                    | 65.5              | 61.1               | 75.9              | 64.1                    |
| Mar.   | 65.7               | 54.4                    | 56.8              | 57.1               | 73.4              | 62.1                    |
| Apr.   | 80.1               | 59.2                    | 66.2              | 61.0               | 76.1              | 62.5                    |
| May    | 75.5               | 65.3                    | 65.4              | 66.8               | 78.3              | 65.3                    |
| June   | 82.5               | 63.4                    | 71.7              | 64.7               | 77.6              | 64.1                    |
| July   | 71.3               | 60.2                    | 60.3              | 60.9               | 71.5              | 61.0                    |
| Aug.   | 67.9               | 61.7                    | 58.5              | 63.0               | 75.5              | 62.1                    |
| Sept.  | 61.7               | 66.8                    | 60.8              | 68.9               | 73.9              | 66.8                    |
| Oct.   | 64.3               | 66.4                    | 61.9              | 68.0               | 71.5              | 66.6                    |
| Nov.   | 45.4               | 64.3                    | 56.0              | 67.4               | 75.9              | 66.8                    |
| Dec.   | 61.5               | 63.1                    | 56.7              | 65.7               | 72.3              | 66.1                    |
| Yearly | 68.7               | 62.3                    | 62.1              | 64.2               | 75.4              | 64.6                    |

**In Mexico**

| Month  | Nueva Cd. Guerrero, Tamaulipas |                          |
|--------|--------------------------------|--------------------------|
|        | 1981                           | Average August 1961-1981 |
| Jan.   | 76                             | 78                       |
| Feb.   | 71                             | 75                       |
| Mar.   | 75                             | 70                       |
| Apr.   | 77                             | 70                       |
| May    | 76                             | 76                       |
| June   | 75                             | 74                       |
| July   | 65                             | 71                       |
| Aug.   | 66                             | 72                       |
| Sept.  | 67                             | 77                       |
| Oct.   | 71                             | 76                       |
| Nov.   | 66                             | 76                       |
| Dec.   | 63                             | 77                       |
| Yearly | 71                             | 74                       |

# Some months missing

**DRAINAGE BASIN AND IRRIGATED AREAS****Along the Rio Grande and Tributaries - 1981**

The total area within the outer rim of the Rio Grande basin is about 335,500 square miles but it contains large areas, especially along its southwestern boundary, that contribute no surface runoff to the Rio Grande. Such noncontributing areas constitute about 47 percent of the total area, leaving 176,333 square miles of productive watershed, which is the only one included in the list below.

The irrigated areas shown below are listed in accordance with the location of their diversion points and are all within the Rio Grande basin, except in the Lower Rio Grande Valley where large portions of irrigated lands in both countries lie outside the basin boundary line.

On the United States side, only the areas irrigated in 1981 are shown, except that in the reaches below Falcon Dam, the figures shown represent acreages which were subject to irrigation in 1981 but for which data on the portion actually irrigated is not known. On the Mexican side, part of the data may have been gathered previous to 1981. The irrigated area data tabulated are the best data that could be obtained.

| DESIGNATION OF<br>AREAS AND GAGING STATIONS  | Drainage Basin<br>Square Miles |        |         | Irrigated Areas - Acres |          |         |
|--|--------------------------------|--------|---------|-------------------------|----------|---------|
|  | United<br>States               | Mexico | Total   | United<br>States        | Mexico   | Total   |
| Above Elephant Butte Dam   | 25,923                         | 0      | 25,923  |                         |          |         |
| Elephant Butte Dam to Caballo Dam  | 1,295                          | 0      | 1,295   | 0                       | 0        | 0       |
| Above Caballo Dam  | 27,218                         | 0      | 27,218  | 0                       | 0        | 0       |
| Caballo Dam to American Dam  | 2,053                          | 0      | 2,053   | 95,143                  | 0        | 95,143  |
| Above American Dam   | 29,271                         | 0      | 29,271  | 95,143                  | 0        | 95,143  |
| American Dam to Acala Station  | 672                            | 544    | 1,216   | 36,837                  | 14,547   | 51,384  |
| Above Acala Gaging Station   | 29,943                         | 544    | 30,487  | 131,980                 | 14,547   | 146,527 |
| Acala Station to Fort Quitman Station  | 663                            | 794    | 1,457   | 14,028                  | 0        | 14,028  |
| Above Fort Quitman Gaging Station  | 30,606                         | 1,338  | 31,944  | 146,008                 | 14,547   | 160,555 |
| Fort Quitman Station to Above Presidio Station   | 1,646                          | 1,410  | 3,056   | a) 1,235                | a) 178   | 1,413   |
| Above Presidio Station above Rio Conchos   | 32,252                         | 2,748  | 35,000  | 147,243                 | 14,725   | 161,968 |
| Rio Conchos above Boquilla Dam   | 0                              | 8,131  | 8,131   | 0                       | b) 9,173 | 9,173   |
| Rio Conchos above Luis L. Leon Dam   | 0                              | 22,992 | 22,992  | 0                       |          |         |
| Rio Conchos - Total  | 0                              | 26,404 | 26,404  | 0                       | 352,355  | 352,355 |
| Alamite Creek above Gaging Station   | 1,504                          | 0      | 1,504   | 0                       | 0        | 0       |
| Presidio Station above Rio Conchos to Presidio Station below Rio Conchos - excluding above tributaries | 340                            | 91     | 431     | 2,631                   | 733      | 3,364   |
| Presidio Station above Rio Conchos to Presidio Station below Rio Conchos - Total                       | 1,844                          | 26,495 | 28,339  | 2,631                   | 353,088  | 355,719 |
| Above Presidio Station below Rio Conchos   | 34,096                         | 29,243 | 63,339  | 149,874                 | 367,813  | 517,687 |
| Terlingua Creek above Gaging Station   | 1,070                          | 0      | 1,070   | 0                       | 0        | 0       |
| Presidio Station below Rio Conchos to Johnson Ranch Station - excluding Terlingua Creek                | 1,093                          | 2,258  | 3,351   | 908                     | 1,093    | 2,001   |
| Presidio Station below Rio Conchos to Johnson Ranch Station - Total                                    | 2,163                          | 2,258  | 4,421   | 908                     | 1,093    | 2,001   |
| Above Johnson Ranch Gaging Station   | 36,259                         | 31,501 | 67,760  | 150,782                 | 368,906  | 519,688 |
| Johnson Ranch Station to Foster Ranch Station  | 6,412                          | 6,570  | 12,982  | c) 205                  | 0        | 205     |
| Above Foster Ranch Gaging Station  | 42,671                         | 38,071 | 80,742  | 150,987                 | 368,906  | 519,893 |
| Foster Ranch Station to Langtry Station  | 182                            | 505    | 687     | 0                       | 0        | 0       |
| Above Langtry Gaging Station (Discontinued)  | 42,853                         | 38,576 | 81,429  | 150,987                 | 368,906  | 519,893 |
| Pecos River above Girvin   | 29,562                         | 0      | 29,562  | 0                       | 0        | 0       |
| Pecos River, Girvin to Station near Langtry  | 5,617                          | 0      | 5,617   | 0                       | 0        | 0       |
| Pecos River above Station at Mouth (Discontinued)  | 35,308                         | 0      | 35,308  | 0                       | 0        | 0       |
| Devils River above Pafford Crossing Station  | 3,961                          | 0      | 3,961   | 0                       | 0        | 0       |
| Devils River above Station near Mouth (Discontd.)  | 4,305                          | 0      | 4,305   | 0                       | 0        | 0       |
| Langtry Station to Amistad Dam - excluding above tributaries   | 217                            | 1,875  | 2,092   | 0                       | 0        | 0       |
| Langtry Station to Amistad Dam - Total   | 39,830                         | 1,875  | 41,705  | 0                       | 0        | 0       |
| Above Amistad Dam  | 82,683                         | 40,451 | 123,134 | 150,987                 | 368,906  | 519,893 |
| Amistad Dam to Below Amistad Dam Gaging Station  | 5                              | 4      | 9       | 0                       | 0        | 0       |
| Above the Below Amistad Dam Gaging Station   | 82,688                         | 40,455 | 123,143 | 150,987                 | 368,906  | 519,893 |
| Below Amistad Dam to Del Rio Station   | 60                             | 100    | 160     | 212                     | 0        | 212     |
| Above Del Rio Gaging Station   | 82,748                         | 40,555 | 123,303 | 151,199                 | 368,906  | 520,105 |
| Arroyo Las Vacas above Gaging Station  | 0                              | 350    | 350     | 0                       | 227      | 227     |
| San Felipe Creek above Gaging Station  | 46                             | 0      | 46      | 2,056                   | 0        | 2,056   |
| Pinto Creek above Gaging Station   | 249                            | 0      | 249     | 400                     | 0        | 400     |
| Rio San Diego above Gaging Station   | 0                              | 853    | 853     | 0                       | 31,036   | 31,036  |
| Rio San Diego - Total  | 0                              | 859    | 859     | 0                       | 32,677   | 32,677  |

## DRAINAGE BASIN AND IRRIGATED AREAS

Along the Rio Grande and Tributaries - 1981

| DESIGNATION OF<br>AREAS AND GAGING STATIONS                                 | Drainage Basin<br>Square Miles |        |         | Irrigated Areas - Acres |           |           |
|---|--------------------------------|--------|---------|-------------------------|-----------|-----------|
|   | United<br>States               | Mexico | Total   | United<br>States        | Mexico    | Total     |
| Del Rio Station to Jimenez Station - excluding<br>above tributaries         | 669                            | 110    | 779     | d) 40,446               | 4,300     | 44,746    |
| Del Rio Station to Jimenez Station - Total                                  | 964                            | 1,319  | 2,283   | 42,902                  | 37,204    | 80,106    |
| Above the Jimenez Gaging Station  | 83,712                         | 41,874 | 125,586 | 194,101                 | 406,110   | 600,211   |
| Rio San Rodrigo above Gaging Station  | 0                              | 1,049  | 1,049   | 0                       | 6,546     | 6,546     |
| Rio San Rodrigo - Total   | 0                              | 1,049  | 1,049   | 0                       | 6,546     | 6,546     |
| Jimenez Station to Maverick Power Plant -<br>excluding Rio San Rodrigo      | 287                            | 114    | 401     | 1,510                   | 0         | 1,510     |
| Jimenez Station to Maverick Power Plant - Total                             | 287                            | 1,163  | 1,450   | 1,510                   | 6,546     | 8,056     |
| Above Maverick Power Plant  | 83,999                         | 43,037 | 127,036 | 195,611                 | 412,656   | 608,267   |
| Maverick Power Plant to Piedras Negras Station                              | 244                            | 32     | 276     | 160                     | 2,782     | 2,942     |
| Above Piedras Negras Gaging Station   | 88,243                         | 43,069 | 127,312 | 195,771                 | 415,438   | 611,209   |
| Rio Escondido above Gaging Station  | 0                              | 1,459  | 1,459   | 0                       | 10,314    | 10,314    |
| Rio Escondido - Total   | 0                              | 1,471  | 1,471   | 0                       | 10,314    | 10,314    |
| Piedras Negras Station to El Indio Station -<br>excluding Rio Escondido     | 237                            | 206    | 443     | 320                     | 1,171     | 1,491     |
| Piedras Negras Station to El Indio Station - Total                          | 237                            | 1,677  | 1,914   | 320                     | 11,485    | 11,805    |
| Above El Indio Gaging Station   | 88,480                         | 44,746 | 129,226 | 196,091                 | 426,923   | 623,014   |
| El Indio Station to Villa Hidalgo Station                                   | 629                            | 1,683  | 2,312   | 500                     | 1,471     | 1,971     |
| Above Villa Hidalgo Gaging Station  | 85,109                         | 46,429 | 131,538 | 196,591                 | 428,394   | 624,985   |
| Villa Hidalgo Station to Nuevo Laredo Station                               | 607                            | 433    | 1,040   | 3,579                   | 3,064     | 6,643     |
| Above Nuevo Laredo Gaging Station   | 85,716                         | 46,862 | 132,578 | 200,170                 | 431,458   | 631,628   |
| Rio Salado above Venustiano Carranza Dam                                    | 0                              | 15,831 | 15,831  | 0                       | 61,282    | 61,282    |
| Rio Salado above Las Tortillas Gaging Station                               | 0                              | 23,155 | 23,155  | 0                       | 134,435   | 134,435   |
| Rio Salado above River Road Crossing  | 0                              | 23,323 | 23,323  | 0                       | 134,435   | 134,435   |
| Nuevo Laredo Station to Falcon Dam - excluding<br>Rio Salado                | 2,042                          | 1,327  | 3,369   | e) 8,379                | 5,098     | 13,477    |
| Nuevo Laredo Station to Falcon Dam - Total                                  | 2,042                          | 24,650 | 26,692  | 8,379                   | 139,533   | 147,912   |
| Amistad Dam to Falcon Dam -<br>excluding above tributaries                  | 4,780                          | 4,009  | 8,789   | 55,106                  | 17,886    | 72,992    |
| Above Falcon Dam  | 87,758                         | 71,512 | 159,270 | 208,549                 | 570,991   | 779,540   |
| Rio Alamo above Gaging Station  | 0                              | 1,675  | 1,675   | 0                       | 7,660     | 7,660     |
| Rio San Juan above Marte Gomez Dam  | 0                              | 12,745 | 12,745  | 0                       | 102,549   | 102,549   |
| Rio San Juan - Marte Gomez Dam to Camargo<br>Gaging Station                 | 0                              | 195    | 195     | 0                       | 100,767   | 100,767   |
| Rio San Juan - Total  | 0                              | 12,949 | 12,949  | 0                       | 203,316   | 203,316   |
| Falcon Dam to Rio Grande City Station -<br>excluding above tributaries      | 222                            | 246    | 468     | 5,259                   | 353       | 5,612     |
| Falcon Dam to Rio Grande City Station - Total                               | 222                            | 14,870 | 15,092  | 5,259                   | 211,329   | 216,588   |
| Above Rio Grande City Gaging Station  | 87,980                         | 86,382 | 174,362 | 213,808                 | 782,320   | 996,128   |
| Rio Grande City Station to Anzalduas Dam                                    | 952                            | 798    | 1,750   | 179,639                 | 364,178   | 543,817   |
| Above Anzalduas Dam   | 88,932                         | 87,180 | 176,112 | 393,447                 | 1,146,498 | 1,539,945 |
| Anzalduas Dam to Progreso Station   | 13                             | 163    | 176     | 130,445                 | 885       | 131,330   |
| Above Progreso Gaging Station   | 88,945                         | 87,343 | 176,288 | 523,892                 | 1,147,383 | 1,671,275 |
| Progreso Station to San Benito Station                                      | 7                              | 9      | 16      | 320,369                 | 459       | 320,828   |
| Above San Benito Gaging Station   | 88,952                         | 87,352 | 176,304 | 844,261                 | 1,147,842 | 1,992,103 |
| San Benito Station to Brownsville Station                                   | 14                             | 15     | 29      | 90,857                  | 435       | 91,292    |
| Falcon Dam to Brownsville Station -<br>excluding Rio Alamo and Rio San Juan | 1,208                          | 1,231  | 2,439   | 726,569                 | 366,310   | 1,092,879 |
| Above Brownsville Gaging Station  | 88,966                         | 87,367 | 176,333 | 935,118                 | 1,148,277 | 2,083,395 |
| Brownsville Station to Gulf of Mexico                                       |                                |        |         | 4,665                   | 0         | 4,665     |
| Falcon Dam to Gulf of Mexico -<br>excluding Rio Alamo and Rio San Juan      |                                |        |         | 731,234                 | 366,310   | 1,097,544 |
| Amistad Dam to Gulf of Mexico -<br>excluding above tributaries              |                                |        |         | 786,340                 | 384,196   | 1,170,536 |
| Above Gulf of Mexico  |                                |        |         | 939,783                 | 1,148,277 | 2,088,060 |

a) Total area irrigated from the Rio Grande at least once during the year; additional irrigations from this source dependent on availability of river water in this reach

b) Includes area above Madero Reservoir

c) Includes 50 acres irrigated by spreader dams

d) Includes 38,364 acres irrigated from the Maverick Canal below Mile 13 gaging station

e) Includes 110 acres irrigated from small reservoirs

**SUPPLEMENTARY DATA—INTERNATIONAL AMISTAD RESERVOIR****Deduced Inflows**

Considering that a knowledge of the mean daily inflows reaching the International Amistad Reservoir would serve a useful purpose, such data have been deduced for 1981 showing the flows as closely as they can be approximated. These data are based on the daily operation of the International Amistad Reservoir, taking into account: a) record of gage heights at the dam; b) releases; c) filtrations; d) elevation-area-capacity tables based on 1961 and 1981 surveys; and e) rate of evaporation measured at the dam.

Flow contributions from different sources, river channel losses, reservoir evaporation, accuracy of gage-height records, displacement due to wind action on the reservoir, and bank storage and return incident to changes in reservoir level, all tend to cause variations in the deduced determinations; and the inflows shown below should not necessarily be in agreement with the combined flow of the Rio Grande at Foster Ranch, Pecos River near Langtry, and Devils River at Pafford Crossing.

In spite of the deficiencies noted above and others that may occur, the data shown below represent a reasonable approximation of the flows entering the International Amistad Reservoir.

**Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary**

| Day        | Jan.          | Feb.  | March          | April  | May            | June   | July  | Aug.           | Sept. | Oct.           | Nov.  | Dec.          |
|------------|---------------|-------|----------------|--------|----------------|--------|-------|----------------|-------|----------------|-------|---------------|
| 1          | 1,890         | 1,740 | 2,870          | 3,040  | 6,570          | 2,380  | 3,390 | 2,700          | 4,310 | 4,730          | 3,710 | 2,390         |
| 2          | 1,800         | 1,620 | 2,880          | 2,850  | 16,100         | 2,000  | 3,740 | 2,980          | 3,370 | 4,060          | 3,880 | 2,190         |
| 3          | 1,850         | 1,730 | 3,330          | 2,800  | 8,480          | 2,300  | 3,390 | 2,560          | 3,600 | 3,290          | 3,640 | 2,210         |
| 4          | 1,820         | 1,800 | 3,290          | 2,730  | 6,500          | 3,810  | 3,280 | 2,270          | 3,670 | 3,640          | 3,670 | 2,100         |
| 5          | 1,860         | 1,880 | 3,230          | 2,500  | 4,870          | 3,920  | 3,390 | 2,310          | 3,230 | 3,510          | 3,670 | 1,930         |
| 6          | 2,130         | 1,880 | 3,170          | 2,360  | 5,300          | 3,880  | 3,050 | 2,630          | 2,870 | 4,240          | 3,670 | 1,870         |
| 7          | 2,160         | 2,250 | 3,140          | 2,380  | 5,970          | 3,020  | 3,060 | 2,840          | 3,330 | 9,220          | 3,570 | 1,920         |
| 8          | 2,180         | 2,400 | 3,010          | 2,560  | 6,640          | 3,130  | 2,790 | 5,090          | 4,030 | 9,610          | 3,510 | 1,910         |
| 9          | 2,200         | 2,520 | 2,950          | 2,820  | 4,410          | 3,960  | 3,180 | 2,870          | 3,810 | 5,690          | 3,450 | 1,930         |
| 10         | 2,310         | 2,530 | 2,640          | 2,830  | 3,510          | 3,430  | 5,160 | 2,590          | 4,240 | 6,460          | 3,460 | 2,360         |
| 11         | 2,250         | 2,480 | 2,960          | 2,910  | 3,070          | 3,600  | 2,990 | 2,600          | 9,640 | 67,800         | 3,220 | 2,720         |
| 12         | 2,310         | 2,620 | 3,280          | 2,860  | 2,320          | 3,320  | 2,820 | 2,400          | 8,760 | 22,300         | 3,150 | 3,020         |
| 13         | 2,310         | 2,340 | 3,270          | 2,900  | 3,000          | 2,860  | 3,080 | 3,230          | 8,120 | 36,400         | 3,160 | 2,950         |
| 14         | 2,360         | 2,630 | 3,250          | 4,980  | 2,990          | 2,730  | 2,920 | 2,800          | 9,110 | 20,900         | 3,230 | 3,020         |
| 15         | 2,340         | 2,650 | 3,450          | 10,900 | 3,380          | 7,170  | 2,610 | 3,390          | 9,390 | 13,300         | 3,300 | 3,060         |
| 16         | 2,230         | 2,660 | 3,390          | 7,560  | 3,210          | 12,900 | 2,250 | 6,040          | 8,760 | 12,300         | 3,410 | 3,210         |
| 17         | 2,400         | 2,660 | 3,430          | 18,200 | 3,600          | 9,320  | 2,260 | 7,980          | 8,650 | 14,900         | 3,410 | 3,190         |
| 18         | 2,420         | 2,790 | 3,200          | 19,000 | 3,430          | 4,590  | 2,370 | 8,620          | 7,630 | 10,900         | 3,670 | 2,990         |
| 19         | 2,460         | 2,720 | 2,890          | 10,600 | 2,910          | 3,290  | 2,210 | 8,720          | 7,910 | 9,040          | 3,570 | 2,970         |
| 20         | 2,390         | 2,640 | 2,720          | 8,970  | 2,330          | 3,270  | 2,280 | 5,690          | 7,350 | 8,160          | 3,160 | 2,890         |
| 21         | 2,420         | 2,820 | 2,680          | 9,290  | 1,910          | 3,200  | 2,330 | 4,800          | 7,350 | 6,250          | 2,990 | 2,560         |
| 22         | 2,450         | 2,680 | 2,510          | 5,930  | 3,110          | 3,500  | 2,360 | 4,590          | 7,700 | 10,100         | 2,890 | 2,770         |
| 23         | 2,440         | 2,660 | 2,520          | 7,380  | 3,200          | 3,500  | 2,100 | 4,630          | 7,380 | 7,060          | 2,780 | 2,720         |
| 24         | 2,450         | 2,630 | 2,460          | 6,460  | 3,050          | 3,470  | 1,890 | 4,630          | 7,700 | 5,690          | 2,580 | 2,730         |
| 25         | 2,500         | 2,640 | 2,540          | 8,400  | 2,770          | 3,480  | 1,980 | 5,010          | 7,590 | 5,650          | 2,490 | 2,770         |
| 26         | 2,440         | 2,650 | 2,540          | 8,900  | 2,500          | 3,600  | 2,130 | 4,800          | 8,930 | 5,370          | 2,480 | 2,770         |
| 27         | 2,220         | 2,670 | 2,670          | 4,730  | 2,450          | 3,430  | 2,340 | 4,480          | 8,330 | 4,240          | 2,530 | 2,830         |
| 28         | 2,030         | 2,640 | 2,830          | 3,960  | 2,810          | 3,070  | 2,330 | 4,590          | 8,140 | 3,990          | 2,650 | 2,890         |
| 29         | 1,990         |       | 2,880          | 3,640  | 2,840          | 2,600  | 2,270 | 4,200          | 7,730 | 4,170          | 2,510 | 2,480         |
| 30         | 1,950         |       | 2,880          | 4,200  | 3,010          | 2,700  | 2,600 | 4,410          | 6,390 | 3,740          | 2,470 | 2,310         |
| 31         | 1,860         |       | 3,000          |        | 2,740          |        | 2,780 | 3,990          |       | 3,960          |       | 2,240         |
| <b>Sum</b> | <b>67,930</b> |       | <b>178,640</b> |        | <b>117,430</b> |        |       | <b>130,440</b> |       | <b>330,670</b> |       | <b>79,900</b> |
|            | <b>68,420</b> |       | <b>91,860</b>  |        | <b>128,980</b> |        |       | <b>85,330</b>  |       | <b>199,320</b> |       | <b>95,880</b> |

**Current Year 1981****Period 1973-1981**

| Month         | Extreme Gage Feet |     | Extreme Second-Feet |               | Average Second-Feet            | Total Acre-Feet | Acre-Feet                        |                  |                  |
|---------------|-------------------|-----|---------------------|---------------|--------------------------------|-----------------|----------------------------------|------------------|------------------|
|               | High              | Low | Day                 | Day           |                                |                 | Average                          | Maximum          | Minimum          |
| Jan.          |                   |     | 25                  | 2,500         | 2                              | 1,800           | 2,210                            | 135,734          | 106,093          |
| Feb.          |                   |     | 21                  | 2,820         | 2                              | 1,620           | 2,430                            | 134,739          | 109,030          |
| Mar.          |                   |     | 15                  | 3,450         | 24                             | 2,460           | 2,960                            | 182,181          | 157,099          |
| Apr.          |                   |     | 18                  | 19,000        | 6                              | 2,360           | 5,970                            | 354,458          | 179,421          |
| May           |                   |     | 2                   | 16,100        | 21                             | 1,910           | 4,170                            | 255,756          | 191,345          |
| June          |                   |     | 16                  | 12,900        | 2                              | 2,000           | 3,920                            | 232,992          | 187,609          |
| July          |                   |     | 10                  | 5,160         | 24                             | 1,890           | 2,750                            | 169,292          | 229,774          |
| Aug.          |                   |     | 19                  | 8,720         | 4                              | 2,270           | 4,200                            | 258,719          | 274,380          |
| Sept.         |                   |     | 11                  | 9,640         | 6                              | 2,870           | 6,640                            | 395,350          | 464,783          |
| Oct.          |                   |     | 11                  | 67,800        | 3                              | 3,290           | 10,700                           | 655,884          | 352,140          |
| Nov.          |                   |     | 2                   | 3,880         | 30                             | 2,470           | 3,200                            | 190,243          | 162,818          |
| Dec.          |                   |     | 16                  | 3,210         | 6                              | 1,870           | 2,580                            | 158,435          | 115,383          |
| <b>Yearly</b> |                   |     |                     | <b>67,800</b> |                                | <b>1,620</b>    | <b>4,310</b>                     | <b>3,123,783</b> | <b>2,529,875</b> |
|               |                   |     | <b>Meters</b>       |               | <b>Cubic Meters per Second</b> |                 | <b>Thousands of Cubic Meters</b> |                  |                  |
|               |                   |     |                     |               | 1,920                          | 45.9            | 122                              | 3,853,146        | 3,120,596        |
|               |                   |     |                     |               |                                |                 |                                  | <b>5,339,819</b> | <b>1,991,788</b> |

**θ** Mean daily

## SUPPLEMENTARY DATA--INTERNATIONAL FALCON RESERVOIR

## Deduced Inflows

Considering that a knowledge of the mean daily inflows reaching the International Falcon Reservoir would serve a useful purpose, such data have been deduced for 1981 showing the flows as closely as they can be approximated. These data are based on the daily operation of the International Falcon Reservoir, taking into account: a) record of gage heights at the dam; b) releases as measured at both hydroelectric plants and outlet works; c) elevation-area-capacity tables based on 1971-1972 surveys; and d) rate of evaporation measured at the dam and Nueva Cd. Guerrero applied to an area one foot higher than the average area of two consecutive days.

Flow contributions from different sources, irrigation diversion between Laredo and Falcon, river channel losses, reservoir evaporation, accuracy of gage-height records, displacement due to wind action on the reservoir, and bank storage and return incident to changes in reservoir level, all tend to cause variations in the deduced determinations; and the inflows shown below should not necessarily be in agreement with the combined flow of the Rio Grande at Laredo and the Rio Salado at Las Tortillas.

In spite of the deficiencies noted above and others that may occur, the data shown below represent a reasonable approximation of the flows entering the International Falcon Reservoir.

## Mean Daily Discharge in Second-Feet 1981 — Annual and Period Summary

| Day        | Jan.          | Feb.  | March          | April  | May            | June   | July           | Aug.   | Sept.          | Oct.   | Nov.          | Dec.  |
|------------|---------------|-------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|---------------|-------|
| 1          | 3,010         | 2,090 | 3,080          | 2,600  | 12,500         | 6,500  | 7,420          | 2,630  | 2,600          | 5,970  | 2,870         | 1,860 |
| 2          | 2,150         | 3,040 | 2,740          | 1,560  | 25,100         | 6,250  | 6,530          | 2,360  | 3,570          | 6,360  | 2,550         | 1,610 |
| 3          | 2,710         | 3,190 | 2,710          | 2,370  | 48,700         | 6,920  | 6,890          | 1,890  | 5,440          | 3,670  | 2,280         | 2,070 |
| 4          | 2,680         | 3,490 | 3,010          | 1,500  | 37,800         | 8,370  | 8,480          | 1,900  | 4,310          | 3,600  | 1,510         | 2,270 |
| 5          | 2,800         | 3,670 | 2,190          | 2,240  | 25,400         | 3,310  | 5,760          | 2,230  | 4,660          | 1,040  | 1,970         | 1,910 |
| 6          | 4,060         | 1,320 | 1,700          | 2,230  | 18,000         | 4,590  | 14,800         | 1,130  | 5,330          | 1,490  | 2,370         | 1,860 |
| 7          | 1,730         | 1,720 | 2,460          | 2,410  | 17,800         | 4,800  | 6,530          | 904    | 4,700          | 5,540  | 1,910         | 2,340 |
| 8          | 2,600         | 1,830 | 2,180          | 2,290  | 17,800         | 5,010  | 31,200         | 1,530  | 5,090          | 4,060  | 2,370         | 2,390 |
| 9          | 2,960         | 3,160 | 2,330          | 1,940  | 16,800         | 4,520  | 18,500         | 1,180  | 5,580          | 5,400  | 3,510         | 2,500 |
| 10         | 3,070         | 3,740 | 3,960          | 2,350  | 8,400          | 4,770  | 9,360          | 2,070  | 4,240          | 2,740  | 1,980         | 2,030 |
| 11         | 2,720         | 2,700 | 5,470          | 2,190  | 8,900          | 3,110  | 6,530          | 2,420  | 3,810          | 3,110  | 2,090         | 2,440 |
| 12         | 3,380         | 3,250 | 1,300          | 2,380  | 8,440          | 6,780  | 5,120          | 2,960  | 4,240          | 3,080  | 2,440         | 2,410 |
| 13         | 3,510         | 4,130 | 1,530          | 2,980  | 9,710          | 13,800 | 5,720          | 2,270  | 3,880          | 2,780  | 1,970         | 2,320 |
| 14         | 3,290         | 2,890 | 2,180          | 3,780  | 8,720          | 11,200 | 5,160          | 2,080  | 6,180          | 9,680  | 2,050         | 2,560 |
| 15         | 2,570         | 2,560 | 3,740          | 11,200 | 7,910          | 11,900 | 3,780          | 2,610  | 5,580          | 13,100 | 3,010         | 2,380 |
| 16         | 2,490         | 3,060 | 2,500          | 15,600 | 7,490          | 19,000 | 5,090          | 2,650  | 5,900          | 10,700 | 3,030         | 2,440 |
| 17         | 2,980         | 2,490 | 1,980          | 12,500 | 7,270          | 23,100 | 4,980          | 3,250  | 6,710          | 14,100 | 2,570         | 2,080 |
| 18         | 3,040         | 2,710 | 2,500          | 14,000 | 9,010          | 22,800 | 4,450          | 3,290  | 6,430          | 17,300 | 2,180         | 2,460 |
| 19         | 3,440         | 2,550 | 2,380          | 15,900 | 6,670          | 15,800 | 4,130          | 4,410  | 7,660          | 6,430  | 2,780         | 1,800 |
| 20         | 3,310         | 2,610 | 2,080          | 15,500 | 6,250          | 15,500 | 4,560          | 6,070  | 8,090          | 6,110  | 2,040         | 1,910 |
| 21         | 3,090         | 3,300 | 2,840          | 19,500 | 4,100          | 15,500 | 4,270          | 5,760  | 7,490          | 7,630  | 2,020         | 1,680 |
| 22         | 1,660         | 1,970 | 2,600          | 19,000 | 5,120          | 14,500 | 4,410          | 6,990  | 8,720          | 10,300 | 2,050         | 2,320 |
| 23         | 2,560         | 1,970 | 1,310          | 17,900 | 4,910          | 14,500 | 4,630          | 8,860  | 8,650          | 9,610  | 2,540         | 2,430 |
| 24         | 2,650         | 1,700 | 1,890          | 18,300 | 4,100          | 13,600 | 4,870          | 8,370  | 7,770          | 9,530  | 2,480         | 2,080 |
| 25         | 2,510         | 2,130 | 1,590          | 23,600 | 12,900         | 12,400 | 4,980          | 9,680  | 7,840          | 9,780  | 2,600         | 2,510 |
| 26         | 3,530         | 2,140 | 1,650          | 17,200 | 7,490          | 13,100 | 4,280          | 10,200 | 7,770          | 6,040  | 3,010         | 2,500 |
| 27         | 2,600         | 2,520 | 2,270          | 15,800 | 6,360          | 12,500 | 2,830          | 4,910  | 7,060          | 8,300  | 2,850         | 2,050 |
| 28         | 2,540         | 3,190 | 2,280          | 12,100 | 7,490          | 9,920  | 3,670          | 6,460  | 6,890          | 7,770  | 2,780         | 2,050 |
| 29         | 3,030         |       | 3,010          | 13,000 | 7,630          | 10,300 | 3,640          | 3,270  | 6,920          | 6,290  | 2,960         | 2,420 |
| 30         | 2,070         |       | 2,360          | 14,400 | 11,300         | 9,640  | 2,440          | 1,670  | 6,180          | 4,380  | 3,200         | 1,880 |
| 31         | 2,720         |       | 2,180          |        | 7,630          |        | 2,420          | 2,000  |                | 3,920  |               | 1,860 |
| <b>Sum</b> | <b>75,120</b> |       | <b>288,320</b> |        | <b>323,990</b> |        | <b>118,004</b> |        | <b>209,810</b> |        | <b>67,420</b> |       |
|            | <b>87,460</b> |       | <b>76,000</b>  |        | <b>387,700</b> |        | <b>207,530</b> |        | <b>179,290</b> |        | <b>73,970</b> |       |

| Month  | Extreme Gage Feet |     |     | Extreme Second-Feet     |        | Average Second-Feet | Total Acre-Feet           | Acre-Feet |           |           |           |  |
|--------|-------------------|-----|-----|-------------------------|--------|---------------------|---------------------------|-----------|-----------|-----------|-----------|--|
|        | High              |     | Low | High                    |        |                     |                           | Average   | Maximum   | Minimum   |           |  |
|        | High              | Low |     | Day                     | Day    |                     |                           |           |           |           |           |  |
| Jan.   |                   |     |     | 6                       | 4,060  | 22                  | 1,660                     | 2,820     | 173,460   | 125,592   | 245,376   |  |
| Feb.   |                   |     |     | 13                      | 4,130  | 6                   | 1,320                     | 2,680     | 148,993   | 155,726   | 453,053   |  |
| Mar.   |                   |     |     | 11                      | 5,470  | 12                  | 1,300                     | 2,450     | 150,744   | 159,900   | 431,073   |  |
| Apr.   |                   |     |     | 25                      | 23,600 | 4                   | 1,500                     | 9,610     | 571,717   | 571,717   | 49,911    |  |
| May    |                   |     |     | 3                       | 48,700 | 121                 | 4,100                     | 12,500    | 768,748   | 311,619   | 768,748   |  |
| June   |                   |     |     | 17                      | 23,100 | 11                  | 3,110                     | 10,800    | 642,988   | 304,765   | 770,709   |  |
| July   |                   |     |     | 8                       | 31,200 | 31                  | 2,420                     | 6,710     | 411,565   | 331,715   | 1,056,340 |  |
| Aug.   |                   |     |     | 26                      | 10,200 | 7                   | 904                       | 3,810     | 234,211   | 292,038   | 1,023,293 |  |
| Sept.  |                   |     |     | 22                      | 8,720  | 1                   | 2,600                     | 5,970     | 355,592   | 443,497   | 1,442,682 |  |
| Oct.   |                   |     |     | 18                      | 17,300 | 5                   | 1,040                     | 6,780     | 415,950   | 378,229   | 1,365,884 |  |
| Nov.   |                   |     |     | 9                       | 3,510  | 4                   | 1,510                     | 2,460     | 146,647   | 184,561   | 538,929   |  |
| Dec.   |                   |     |     | 14                      | 2,560  | 2                   | 1,610                     | 2,180     | 133,773   | 143,557   | 304,865   |  |
|        |                   |     |     |                         | 48,700 |                     | 904                       | 5,720     | 4,154,388 | 3,002,674 | 6,234,950 |  |
| Yearly | Meters            |     |     | Cubic Meters per Second |        |                     | Thousands of Cubic Meters |           |           |           |           |  |
|        |                   |     |     |                         | 1,380  |                     | 25.6                      | 162       | 5,124,382 | 3,703,758 | 7,690,727 |  |
|        |                   |     |     |                         |        |                     |                           |           |           |           | 1,578,946 |  |

Ø Mean daily

! And other days

**CORRECTIONS TO PREVIOUS WATER BULLETINS**

| <u>Water<br/>Bulletin<br/>and Page<br/>Number</u> | <u>Heading</u>   | <u>Reference</u>  | <u>Published As</u>                        | <u>Correction</u>                          |
|---|--|---|--|--|
| 48 - 90   | Stored Water in Large Reservoirs of the Rio Grande Basin-In Mexico | Marte R. Gomez capacity   | 898.3                                      | 889.3                                      |
| 49 - 85   |  |   |  |  |
| 50 - 85   |  |   |  |  |
| 50 - 88   | Quality of Water   | Rio Grande at El Paso, second table, column headed Solids Dissolved (Calculated), February                            | 340  | 1,340                                      |
| 48 - 113  | Quality of Water   | Rancherias Drain near Camargo, Tamaulipas, first line of LOCATION paragraph   | 1,000 feet (600 m)                         | 1,950 feet (600 m)                         |
| 49 - 104  |  |   |  |  |
| 48 - 115  | Quality of Water   | Puer tecitos Drain and Los Indios Drain near Cd. Diaz Ordaz, Tamaulipas, second and third lines of LOCATION paragraph | 1,050 feet (650 m)<br>2,100 feet (1,300 m) | 2,150 feet (650 m)<br>4,250 feet (1,300 m) |
| 49 - 106  |  |   |  |  |

