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WATER BULLETIN NUMBER 7

Flow of the Rio Grande and Tributary Contributions

From San Marcial, New Mexico to the Gulf of Mexico

1937

WITH NORMALS

AUTHENTICATED DISCHARGE RECORDS 1889-1937

REVISED FLOW RECORDS AND NORMALS 1900-1913

STORAGE CAPACITIES AND WATER STORED IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN 1908-1937

COMPARISONS OF RUN-OFFS FOR TWO PERIODS 1900-1913 and 1924-1937

SILT, CHEMICAL CONSTITUENTS, BACTERIA AND DISSOLVED OXYGEN

THE RIO GRANDE SALT BURDEN

RAINFALL AND EVAPORATION

DIVERSIONS

AREAS

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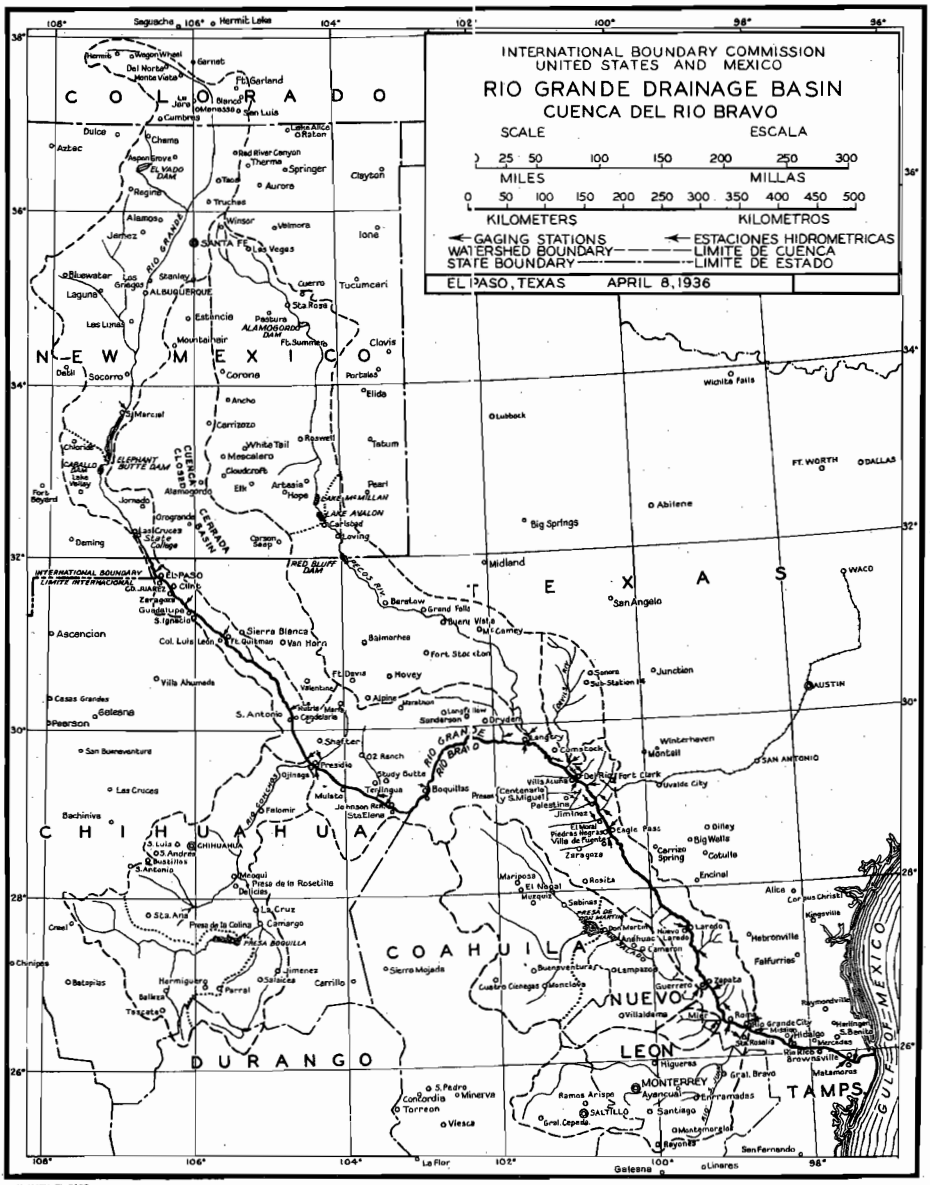


RIO GRANDE DRAINAGE BASIN

CUENCA DEL RIO BRAVO

FOREWORD

This compilation of stream discharge and related data is the seventh unified publication relative to the cooperative determination of the flow of the international portion of the Rio Grande. The first such publication was Water Bulletin No. 1 covering the year 1931. These data are published jointly by the United States and Mexican Sections of the International Boundary Commission and represent the results of stream flow measurements made on the Rio Grande and on important tributaries near their confluence, from San Marcial, New Mexico, which is at the head of Elephant Butte reservoir, to the Gulf of Mexico, for the year 1937, as well as adjustments to and authentications of hydrographic records.

International stream gaging was begun in 1889, with the operation of the station at El Paso, Texas. A number of stations on the Lower Rio Grande and tributaries below El Paso were established in 1900 and operated until 1914. From 1914 to 1923 all such work was suspended except for a few months in 1919 and 1920. In 1923 the work was resumed and carried on independently by the two countries until 1931, when the present cooperative work began.

The duties and functions of the United States Section of the International Water Commission were transferred to the United States Section of the International Boundary Commission by Act of June 30, 1932. On January 1, 1932, the Mexican Section of the International Boundary Commission similarly took over the duties of the Mexican Section of the International Water Commission.

This cooperative arrangement for obtaining hydrologic data is the result of the concurrence and agreement by both sections of the International Commission that a coordinated result should be insured and that an accurate and complete hydrographic record of international flow was necessary.

Of stream gaging stations on the Rio Grande, those at Laredo, Texas, and Matamoros, Tamaulipas, were operated in 1937 by the Mexican Section of the Commission, the others by the United States Section. Each section operated the gaging stations on tributaries entering the Rio Grande from its own country, or on floodways or diversions within its borders.

Acknowledgments

Some of the data published herein relative to chemical and bacteriological analyses, silt, stored water, evaporation and rainfall have been furnished by the following agencies within the two countries: United States Department of Agriculture, United States Bureau of Reclamation, Agricultural and Mechanical College of Texas, State Engineer of New Mexico, Middle Rio Grande Conservancy District, Red Bluff Water Power Control District, Federal Board of Public Improvements of Nuevo Laredo, Tamaulipas, National Irrigation Commission of Mexico, Cia. Agricola y de Fuerza Electrica Del Rio Conchos, S. A., and the Mexican Department of Agriculture and Development. Specific acknowledgement is made where the data appear.

General Hydrologic Conditions for 1937

Along and Adjacent to
The International Portion of the Rio Grande

For 1937 the yearly flow of the Rio Grande and most of its tributaries was below normal. Below Del Rio it was the lowest yearly flow for the 28 years of record, viz. 1900 to 1913 and 1924 to 1937. After receiving the contributions of all tributaries the flow at Rio Grande City was only 51.7% of the normal flow. The lowest flow for the year at this point was 1,020 second feet on August 25. The measured United States tributaries below Fort Quitman flowed about 732,466 acre feet which is 67% of their average amount while the Mexican measured tributaries flowed about 1,159,000 acre feet which is only 41% of their annual average. The region of greatest drought extended from Del Rio and Villa Acuna to and including the Rio San Juan basin. Within this region the subnormality was greatest in the northern portion.

Both in number and in magnitude the floods of 1937 were greatly below those usually occurring. The maximum flood crest at Rio Grande City being only 23,000 second feet on October 12.

The monthly average amount of water in storage in all large reservoirs on the Rio Grande basin was about 2,860,000 acre feet which was only 90% average. One new reservoir was put into operation during the year. It was the Alamogordo Reservoir on the Pecos river in New Mexico with a storage capacity of 157,000 acre feet.

The amount of water consumed in irrigation increased slightly on both sides of the Rio Grande in the El Paso-Juarez valley, also on the Rio Conchos and on the Pecos river as well as on the United States side of the river below Rio Grande City. On the Rio Salado the consumption of water decreased greatly due to water shortage. At other places along the Rio Grande and its tributaries below Fort Quitman there was little change in the amount of water consumed in irrigation.

Precipitation was subnormal for the year in the entire basin below Fort Quitman, and was shortest on the Mexican side.

Evaporation over the entire basin was greater than usual being about 107% of normal.

Ten thousand acre feet of suspended silt passed down the Rio Grande at Eagle Pass. This was about 124% of normal. At Roma the suspended silt was about 7,000 acre feet which was only 59% of normal. It is an unusual fact that more suspended silt passed Eagle Pass than Roma.

The tonnage of salts for the year carried by the Rio Grande at the various gaging stations and the tributary contributions of salts was in general below the average although in general there was an increase in the salt concentration. This increase in concentration was greatest on the Pecos River where an average of 4.3 tons of salts per acre foot of water was found during the year.

Total bacteria and bacilus coli in the Rio Grande water at Nuevo Laredo were found throughout the year to have averaged much below normal.

Authenticated Discharge Records

A table shows the publications in which may be found discharge records of the Rio Grande and its tributary inflows below San Marcial, New Mexico, which have been authenticated by this Commission.

FOREWORD—continued

Quantity of Water

There are here shown for the year 1937: Descriptions of gaging stations and their equipment with pertinent notes concerning station records, high and low flows in previous years, and factors modifying the stream discharge, also the mean daily discharges at points along the Rio Grande and the mean daily inflows from measured tributaries.

Extreme monthly high and low gage heights and peak discharges also average monthly rates of discharge and total monthly and annual acre footages for each regular station.

The calculated flow of the Rio Conchos which was not measured directly, also the miscellaneous estimated flows in Las Vacas Creek near Villa Acuna, Coahuila.

There are also shown: Monthly and annual normal discharges in acre feet for the period 1924 to 1937 inclusive for each gaging station.

The amount of water in storage at the end of each month of 1937 in all large reservoirs of the Rio Grande basin, also the average amounts in storage since 1908, and the storage capacity of such reservoirs.

Revised monthly and annual discharges in acre feet with normals for the Rio Conchos and for the Lower Presidio station for the period 1924 to 1937, inclusive.

Revised monthly and annual discharges in acre feet with normals for all Rio Grande and tributary inflow stations below El Paso, Texas where records were kept for the period 1900 to 1913 inclusive.

Old discharge records missing for five months in 1895 for San Marcial station and supplied by estimates. Similar estimates are shown for five entire years and two parts of years for the El Paso station for years between 1889 and 1915 and four months of record from the Commission's files for the El Paso station in 1914 are published for the first time.

Sources of River Flow

Summation curves show the sources of river flow from the measured tributaries and from points along the Rio Grande below Fort Quitman for the 28 years of record, viz., 1900 to 1913 and 1924 to 1937.

By graph there is shown progressively from station to station downstream, the normal flow for the two 14 year periods, 1900 to 1913 and 1924 to 1937, and also the flow for 1932 and 1937, which were years of maximum and minimum flow respectively, in the lower Rio Grande. On this graph there is also shown normal unused run-off per square mile for various sub-divisions of the Rio Grande basin below Fort Quitman.

Three maps are presented for each of the periods 1900 to 1913 and 1924 to 1937. For sub-divisions of the water-shed they show in average annual acre feet per square mile: (a) the unused stream flow, (b) the total water-shed yield and (c) the total water-shed yield less the estimated deep spring flow.

There is graphically represented progressively downstream below Fort Quitman, the approximate normal unused stream flows from the United States side and from the Mexican side, for the two 14 year periods, 1900 to 1913 and 1924 to 1937.

Quality of Water

With reference to the probable life of storage reservoirs on the Rio Grande, there is shown the results of silt sampling at 3 points on the Rio Grande and on 2 tributaries, as well as a chart showing comparisons of the suspended silt load at Eagle Pass and Roma for the years 1929 to 1937, inclusive.

There is also shown the measured volume of silt accumulated during various periods in Elephant Butte reservoir as well as the weight of suspended silt entering the reservoir during 9-2/3 years and a comparison of the volume and weight of silt.

Showing the suitability of the water of the Rio Grande and tributaries for irrigation use, there is recorded detailed chemical analyses of water samples from seven important points on the Rio Grande and from four tributaries in 1937, and also a graphical representation of the salt burden in tons, its sources and its concentration in the stream flow for 1937 and three year averages for 1935 to 1937.

With reference to the use of Rio Grande water for domestic,recreational, municipal or industrial purposes there is shown the results of bacteriological examinations of water samples at Nuevo Laredo,Tamaulipas, and in the vicinity of El Paso, Texas. The results of tests for dissolved oxygen in Rio Grande water near El Paso are also shown.

Floods

There were no floods of consequence in 1937. The maximum flood peak at Rio Grande City station was 23,000 second feet on October 12.

Rainfall and Evaporation

For its pertinent relation to floods, irrigation and losses from reservoirs there is brought together here from numerous sources, evaporation observations at points on both sides of the basin, also rainfall records from the United States side for 1937 and many rainfall records from the Mexican side of the basin extending from 1937 backward for as many years as records are available.

Diversions

A tabulation covering the 16 years 1922 to 1937 shows for Hidalgo and Cameron Counties, Texas, the monthly and annual amounts of water diverted from the Rio Grande, the average annual acreage of land cultivated, the average annual duty of water, and the average annual rainfall.

Drainage Basin Areas

The drainage basin areas shown in the descriptive matter for each gaging station have been determined from the most reliable sources available. In 1937 the National Resources Committee of the United States determined anew the drainage basin areas above San Marcial,El Paso, and Fort Quitman gaging stations. With field inspections and aerial photographs, H. W. Yeo of the Soil Conservation Service has made a more recent determination of the same areas. The figures from this later determination are used in this Water Bulletin. No other changes in sub-basin areas are made in this Bulletin.

AUTHENTICATED DISCHARGE RECORDS

The tabulation below shows in what publications authenticated discharge records may be found for gaging stations on the Rio Grande from San Marcial, New Mexico, to the Gulf of Mexico, and on tributaries at points near their confluence with the Rio Grande below San Marcial. The table covers all of the years of record for San Marcial and El Paso gaging stations. For stations below El Paso the table covers only the years of record within the two periods: 1900 to 1913 and 1924 to 1937.

Name of Gaging Station	Records for The Years (inclusive)	Considered Correct as Published in the Following:
San Marcial	Jan. and Sept. - Dec. 1895	W.B. 7
	Feb. - Aug. 1895	W.S.P. 358
	1896 - 1930	W.S.P. 358, 388, 408, 438, 458, 478, 508, 528, 628, 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
El Paso	January 1 - May 9, 1889	W.B. 7
	May 10, 1889 - June 30,1893	W.S.P. 358
	July - Dec. 1893	W.B. 7
	1894, 1895, 1896	W.B. 7
	Jan. 1897 - Mar. 1914	W.S.P. 358, 388
	Apr. 1914 - July 1914	W.B. 7
	Aug. 1914 - Nov. 1915	W.S.P. 388,408,568
	Dec. 1915	W.B. 7
	1916 - 1930	W.S.P. 568, 588, 608, 628, 648, 668[e], 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Tornillo Bridge	1924 - 1927	W.B. 5
	Oct. 1927 - 1930	W.S.P. 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Fort Quitman	1924 - 1930	W.S.P. 588, 608, 628, 648, 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
La Nutria	June 1935 -	W.B. 5, 6, 7
Upper Presidio	May * 1900 - 1913	W.B. 7
	1924 - 1925	W.S.P. 588,608,628
	1926 *	W.B. 4
	1927 - 1928	W.B. 4
	1929 - 1930	W.B. 3
	1931 - 1932	W.B. 1, 2
	1933 *	W.B. 3, 4
	1934 - 1937	W.B. 4, 5, 6, 7
Rio Conchos	May 1900 - 1913	W.B. 7
	1924 - *1932	W.B. 7
	1933 - 1937	W.B. 5, 6, 7
Lower Presidio	May * 1900 - 1913	W.B. 7
	1924 *- 1932†	W.B. 7
	1933 - 1937	W.B. 3, 4, 5, 6, 7
Alamito Creek	1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
Terlingua Creek	1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
Johnson Ranch	Apr. - Dec. 1936	W.B. 6
	1937	W.B. 7
Boquillas	1924 - 1928	W.B. 5
	1929 - 1930	W.S.P. 688, 703, 718
	1931 - Apr. 1936	W.B. 1, 2, 3, 4, 5, 6
Lozier Creek	1932 - 1935	W.B. 2, 3, 4, 5
Langtry	May * 1900 - 1913	W.B. 7
	1924 *- 1927	W.B. 4
	1928 - 1930	W.S.P. 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Pecos River	May 1900 - 1913	W.B. 7
	1924 - 1930	W.S.P. 588, 608, 628, 648, 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7

W.S.P. Water Supply Paper of the U. S. Geological Survey. † Station moved June, 1922.
W.B. Water Bulletins of this Commission. * Partially revised in last named Water Bulletin.
e The monthly totals for the year 1928 are slightly revised on page 46, Water Bulletin No. 6.

AUTHENTICATED DISCHARGE RECORDS —continued

Name of Gaging Station	Records for The Years (inclusive)	Considered Correct as Published in the Following:
Goodenough Spring	1924 - 1929	W.B. 5
	Feb. 1929 - 1930	W.S.P. 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Devils River	May 1900 - 1913	W.B. 7
	1924 - 1930	W.S.P. 588, 608, 628, 648, 668, 688, 703, 718
	1931 - 1932*	W.B. 1, 2, 5
	1933* - 1934* 1935 - 1937	W.B. 3, 4, 5 W.B. 5, 6, 7
Cienegas Creek	Sept. June 1931 - 1935	W.B. 1, 2, 3, 4, 5
Del Rio	May * 1900 - 1913	W.B. 7
	1924*	WSP 588, 608 WB 4
	1925 - 1930	W.S.P. 608,628,648, 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
San Felipe Creek	Sept. 1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Sycamore Creek	May 1932 - 1935	W.B. 2, 3, 4, 5
Pinto Creek	Nov. 1928 - 1930	W.S.P. 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Rio San Diego	Oct. 1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
Las Moras Creek	1932 - 1934*	W.B. 2, 3, 4, 5
	1935	W.B. 5
Rio San Rodrigo	1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
Eagle Pass	May * 1900 - 1913	W.B. 7
	1924 *- 1926	W.B. 4
	1927 - 1930	W.S.P. 648, 668, 688, 703, 718
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Rio Escondido	1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
Laredo	May * 1900 - 1913	W.B. 7
	1924 -* 1925	W.B. 4
	1926 *	W.B. 4, 5
	1927 - 1928	W.B. 4
	1929 - 1930	W.B. 3
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Dolores Creek	May 1932 - 1936	W. B. 2, 3, 4, 5, 6
Rio Salado	May 1900 - 1913	W.B. 7
	1924 - 1928	W.B. 5
	1929 - 1930	W.B. 3
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Zapata	1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
El Tigre Creek	Apr. 1932 - 1936	W.B. 2, 3, 4, 5, 6
Rio Alamo	1924 - 1928	W.B. 5
	1929 - 1930	W.B. 3
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Roma	Sept. * 1900 - 1913	W.B. 7
	1924 - 1929	W.B. 5
	Mar. 1929 - 1930	W.S.P. 688, 703, 718
	1931	W.B. 1
	1932 *	W.B. 2, 3
	1933 - 1937	W.B. 3, 4, 5, 6, 7
Rio San Juan	Oct. 1900 - 1913	W.B. 7
	1924 - 1928	W.B. 5
	1929 - 1930	W.B. 3
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Los Olmos Creek	Mar. 1932 - 1936	W.B. 2, 3, 4, 5, 6
Rio Grande City	1924 - 1931	W.B. 5
	1932 - 1937	W.B. 2, 3, 4, 5, 6, 7
Hidalgo	July 1928 - 1930	W.S.P. 668, 688, 703, 718
	1931	W.B. 1
	Partial Records 1932 - 1936	W.B. 2, 3, 4, 5, 6
Mercedes Bridge	Sept. Oct. 1932 - 1932	W.B. 2
	Partial Records 1935 - 1936	W.B. 5, 6
	Nov. Dec. 1937 - 1937	W.B. 7
Matamoros	May 1900 - 1913	W.B. 7
	Sept. 1924 - 1926	W.S.P. 588, 608, 628
	Oct. 1926 - 1928	W.B. 5
	1929 - 1930	W.B. 3
	1931 - 1937	W.B. 1, 2, 3, 4, 5, 6, 7
Lower Brownsville	1934 - 1937	W.B. 4, 5, 6, 7

W.S.P. Water Supply Paper of the U. S. Geological Survey.
W.B. Water Bulletins of this Commission. * Partially revised in last named Water Bulletin.

RIO GRANDE AT SAN MARCIAL STATION

DESCRIPTION: Two water-stage recorders and cable with sit down cable car and winch located at railroad bridge about one mile below San Marcial, New Mexico. Zero of official gage used from March 13, 1932 to April 13, 1937, was 4,455.38 feet above United States Coast and Geodetic Survey sea level datum. This gage and recorder is on the upstream end of the first bridge pier from the South bridge abutment and was operated throughout 1937 except from April 17 to August 30.

RECORDS: Based upon 141 meter measurements, by wading, and from cable about 1,000 feet above railroad bridge. Computations by shifting channel methods. 1937 records good. Records available January, 1895, to December, 1937. See page 51 hereof for old records missing.

REMARKS: A history of the locations and elevations of gages from January, 1895, to March, 1932, is given in Water Bulletin Number 4. On July 9, 1936, operation of a new gage and recorder was started on the downstream end of the South bridge abutment. This was used as the official gage after April 13, 1937. Zero of this new gage is elevation 4,459.08 feet. From April 17 to August 30, 1937, a gage and recorder was operated on the downstream side of the highway bridge, 1.8 miles upstream from the railroad bridge. Elevation of zero of this gage was not determined. From midnight May 28, 29 to June 7, flood water broke westward and flowed through the railroad grade .6 mile upstream from, and by-passed the railroad bridge. On April 23, water which had previously overflowed eastward above the highway bridge began returning to the river .4 mile above the railroad bridge. Water continued to thus by-pass the highway bridge throughout the remainder of the year.

El Vado reservoir on the Rio Chama in New Mexico and many irrigation diversions above this station in Colorado and New Mexico modify the river flow. With all closed basins eliminated the drainage area above this station is 24,717 square miles, all in the United States.

COMPARATIVE FLOWS FROM PREVIOUS RECORDS: Maximum peak in last 109 years, October 11, 1904, 50,000[8] second feet. Average flow for past 43 years 1,550 second feet. See Water Bulletin No. 6 pages 6 and 79 for many maximum and minimum flows for various periods, also all large peak flows since 1828 and their average frequency.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	752	577	1,910	1,330	6,650	10,800	3,710	903	362	469	234	414
2	788	613	1,620	1,090	6,550	8,920	3,320	1,240	502	898	225	406
3	*760	492	1,560	1,030	6,190	8,550	2,980	1,040	992	1,810	229	388
4	*711	596	1,560	1,380	5,800	8,520	4,360	996	835	1,540	260	388
5	*610	504	1,680	2,980	5,660	8,020	4,120	507	660	1,040	244	380
6	*511	733	2,550	2,810	5,850	7,480	2,460	312	468	744	207	344
7	457	747	1,760	1,980	6,300	6,920	2,090	189	597	505	176	340
8	310	795	1,780	1,450	6,710	6,110	1,590	213	1,240	460	184	391
9	448	954	1,560	1,340	7,250	5,250	1,360	208	1,320	360	185	562
10	645	2,160	2,450	1,330	7,840	4,550	1,410	131	1,630	338	197	634
11	*547	2,380	2,740	1,720	8,350	3,920	1,610	81.3	1,500	371	200	647
12	*568	1,200	2,360	2,680	9,500	3,420	2,020	61.0	1,150	466	191	627
13	646	960	2,580	3,640	9,440	2,960	1,930	54.0	823	440	161	672
14	709	828	2,590	4,200	9,160	2,630	1,840	53.3	725	438	165	708
15	615	910	2,350	4,810	9,810	2,480	1,420	53.8	1,070	375	185	774
16	504	1,450	1,880	5,580	10,000	2,330	961	44.0	642	697	337	842
17	582	2,860	2,020	6,680	9,910	2,030	713	50.5	428	1,300	447	908
18	723	3,040	1,830	7,400	9,550	1,740	495	223	289	1,100	481	865
19	687	1,960	1,430	7,260	9,300	1,490	357	302	232	1,200	417	776
20	550	1,660	1,830	7,540	10,100	1,270	248	309	355	1,080	383	711
21	526	1,680	2,030	6,860	9,850	1,160	204	412	299	846	393	683
22	*453	1,530	1,540	6,560	9,730	1,180	159	423	242	746	411	633
23	*317	1,430	1,360	5,760	9,350	1,140	131	479	245	567	431	692
24	*327	1,100	1,360	6,460	8,810	825	93.4	500	282	514	423	654
25	*356	1,120	1,410	7,030	9,090	493	82.4	705	342	490	399	632
26	*264	1,110	1,640	7,160	9,360	485	125	632	147	468	352	600
27	"640	1,130	1,340	6,070	7,990	2,040	105	463	165	469	325	576
28	"720	1,240	1,300	5,460	13,500	9,240	213	327	177	472	311	594
29	"900		1,640	5,730	25,100	7,850	457	307	233	370	356	616
30	"870		1,870	5,920	19,300	4,430	783	268	304	320	388	629
31	627		1,520		12,200		861	239		278		652

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	9.94	8.52	27	"1,900	25	*89	585	35,900	42,118
February	10.70	8.34	10	5,330	5	412	1,280	70,900	47,974
March	10.07	8.82	10	3,210	23	1,140	1,840	113,000	56,922
April	7.17	*8.88	20	7,910	3	904	4,370	260,000	134,195
May	9.32	7.74	29	*30,000	5	5,440	9,490	584,000	262,253
June	8.13	1.87	28	12,000	25	390	4,270	254,000	142,244
July	4.08	.05	4	5,050	25	66.4	1,360	83,700	50,957
August	2.28	-.43	2	1,340	16	37.3	378	23,300	52,949
September	2.60	.32	10	1,840	26	114	609	36,200	59,944
October	2.60	.56	3	2,060	31	250	683	42,000	34,165
November	1.22	0.0	17	554	15	117	297	17,600	29,324
December	1.82	.80	17	927	7	315	604	37,200	39,998
The Year	9.32	-.43		*30,000		37.3	2,150	1,557,800	953,043

" Estimated

* Partly Estimated

8 Revises W. B. No. 5 because of restudy of data, see page 79 of W. B. No. 6

BY-PASS SEEPAGE AT SAN MARCIAL STATION

There is a small amount of seepage water which comes to the surface west of the river channel and northward from the main road which crosses the river at San Marcial. This water joins the river flow below the San Marcial gaging station. By frequent water measurements at the point where this water crosses the road, its mean daily and monthly flow for 12 months has been estimated and is shown below. The period begins with May 1936 and ends with April 1937.

Mean Daily Discharge in Second Feet and Annual Summary, 1936 - 1937

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April
1	*6.3	*3.3	*.5	.4	.6	4.2	*4.9	*5.7	*4.5	*5.2	*5.0	5.5**
2	*6.3	*3.2	.5	*.3	*.4	4.0	*5.5	*5.6	*3.6	*5.2	5.0	
3	*6.3	*3.0	*.4	*.3	*.3	*3.6	6.2	5.4	*2.7	*5.2	*5.1	
4	*6.3	*2.9	*.2	.2	.1	3.2	*5.5	*5.5	1.8	5.1	*5.3	5.6**
5	*6.3	*2.7	.2	*.2	*.1	*2.9	*4.8	*5.6	*1.8	*4.8	*5.4	
6	*6.3	*2.5	*.2	*.1	*.1	*2.6	4.1	5.7	*1.8	4.6	*5.5	
7	*6.3	*2.4	*.1	.1	.1	2.3	*4.3	*5.6	*0	*5.3	*4.4	14.6**
8	*6.3	*2.2	0	*.1	*.1	*2.5	*4.6	*5.5	*5.5	*5.9	3.4	
9	*6.3	*2.0	*.2	*.1	*.1	*2.8	4.8	5.4	*5.5	6.6	*3.7	
10	*6.3	*1.9	*.6	‖.1	.1	3.0	*4.5	*5.0	5.5	*6.4	*3.9	6.2**
11	*6.3	1.7	.8	*.1	*.1	*2.8	*4.2	*4.6	*5.5	*6.3	4.2	
12	*6.3	*1.7	*1.4	*.1	*.1	*2.7	3.9	4.2	*5.4	6.1	*5.1	
13	*6.3	*1.8	*1.4	‖.1	.1	2.5	*4.1	*4.7	5.4	*7.0	*6.1	0**
14	6.3	1.8	1.4	*.1	.1	*2.6	*4.2	*5.1	*4.5	*8.0	7.0	
15	*6.1	*1.7	*1.5	*.1	*.1	*2.7	4.4	5.6	*4.4	8.9	*7.0	
16	*6.0	*1.5	*1.5	*.1	.1	2.8	*4.5	*5.7	*4.2	*8.7	*7.0	-56**
17	*5.8	1.4	1.6	‖.1	*.1	*2.8	*4.7	*5.7	*4.0	*8.4	7.0	
18	*5.6	*1.3	*1.5	*.1	*.1	*2.8	4.8	5.8	*3.9	8.2	*6.4	
19	*5.5	*1.3	*1.3	*.1	.1	*2.7	*5.1	*5.5	*3.9	*7.8	*5.7	
20	*5.3	1.2	1.2	‖.1	*.1	2.7	*5.3	*5.3	*3.9	*7.3	5.1	
21	*5.2	*1.2	*1.1	*.1	*.1	*3.7	5.6	5.0	0	6.9	*5.3	
22	*5.0	*1.1	*1.1	‖.1	.1	4.7	*5.5	*5.1	*0	*6.5	*5.5	
23	*4.8	1.1	1.0	‖.1	*.2	*4.7	*5.3	*5.1	*0	*6.0	5.7	16.2**
24	*4.7	1.2	*.9	*.1	*.2	*4.8	5.2	5.2	3.8	5.6	5.8	
25	*4.5	1.3	*.9	*.1	.2	4.8	*5.2	*5.5	*4.0	*5.4	*5.8	
26	*4.3	1.4	.8	0	*.2	*4.6	*5.1	*5.8	*4.3	*5.2	*5.9	0**
27	*4.2	*1.2	*.7	*.1	*3.1	*4.3	5.1	6.1	*4.6	5.0	*5.9	
28	*4.0	*.9	*.6	*.1	6.0	4.1	*5.4	*5.9	*4.8	*5.0	*6.0	
29	*3.8	.7	.5	1.0	4.6	*4.1	*5.6	*5.8	*5.0		*6.0	
30	*3.7	*.6	*.5	*.9	*4.4	*4.2	5.9	5.6	*5.1		*5.8	0**
31	*3.5		*.4	*.7		4.2		*5.4	5.3		*5.7	

Month 1936 - 1937	Mean Daily Gage Height — Feet		Mean Daily Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	
May			1	*6.3	31	*3.5	*5.5	*338	
June			1	*3.3	30	*.6	*1.7	*104	
July			17	1.6	11	0	*.8	*49.6	
August			29	1.0	26	0	*.2	*12.3	
September			28	6.0	4-22	.1	*.7	*43.8	
October			24-25	4.8	7	2.3	*3.4	*211	
November			3	6.2	12	3.9	*4.9	*294	
December			27	6.1	12	4.2	*5.4	*333	
January			8-11	5.5		0	*3.7	*228	
February			15	8.9	6	4.6	*6.3	*350	
March			14-17	7.0	8	3.4	*5.5	*339	
April							‖6.0	‖360	
The Period				8.9		0	1.3	2,662.7	

* Partly Estimated
‖ Estimated
** These figures represent measurements. Information from hydrographer indicated seepage varied with wind and backwater within each day. Total for the month estimated at 360 acre feet.

RIO GRANDE AT EL PASO STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car and winch located in the pass opposite Courchesne quarry, four miles northwest of El Paso, Texas and 5 miles northwest of Cd. Juarez, Chihuahua. Zero of gage is 3,720.52 feet above United States Coast and Geodetic Survey mean sea level datum. This elevation is a more precise determination than heretofore published.

RECORDS: Based upon 138 meter measurements during the year. Computation by shifting channel methods. 1937 records good. Records Available: 1889 to 1937, inclusive, when combined with records at old Fort Bliss and at Smelter pump house, 3 miles and 1 mile downstream, respectively. See page 51 hereof.

REMARKS: El Vado reservoir on the Rio Chama and Elephant Butte reservoir on the Rio Grande, as well as many irrigation diversions in Colorado, New Mexico and Texas, completely modify the river flow. With all closed basins eliminated the drainage area above this station is 29,267 square miles, all in the United States.

COMPARATIVE FLOWS FROM PREVIOUS RECORDS: Momentary Peak: Max., June 12, 1905, 24,000 sec. ft. with 6.0 feet gage (present datum). This is the greatest peak flow in the past 109 years or more or since 1828. Min., sometimes dry. Daily: Max., June 12, 1905, 23,680 sec. ft. average. Min., sometimes dry. Monthly: Max., June 1905, 14,300 sec. ft. average. Min., sometimes dry. Yearly: Max., 1905, 2,780 sec. ft. average. Min., 1902, 70.1 sec. ft. average. Two Successive Years: Max., 1905 and 1906, 2,160 sec. ft. average. Min., 1899 and 1900, 168 sec. ft. average. Three Successive Years: Max., 1905 to 1907, 2,280 sec. ft. average. Min., 1900 to 1902, 269 sec. ft. average. Four Successive Years: Max., 1904 to 1907, 1,880 sec. ft. average. Min., 1899 to 1902, 227 sec. ft. average. Five Successive Years: Max., 1903 to 1907, 1,790 sec. ft. average. Min., 1898 to 1902, 669 sec. ft. average. Ten Successive Years: Max., 1903 to 1912, 1,560 sec. ft. average. Min., 1927 to 1936, 754 sec. ft. average. Forty-eight Years: Average 1,010 sec. ft. See previous Water Bulletins for numerous peaks. See Water Bulletin No. 6 p. 79 for all large peak flows since 1828 and their average frequency.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	154	130	136	850	847	1,020	1,230	1,310	1,000	536	191	198
2	151	134	134	820	918	1,260	1,150	1,910	1,020	450	181	198
3	147	130	141	872	911	1,300	1,220	1,530	1,100	460	174	195
4	149	130	155	1,100	934	1,040	1,290	1,650	1,180	537	165	179
5	151	129	158	1,190	908	990	1,480	1,490	1,230	520	324	172
6	158	130	144	1,000	1,030	940	1,100	1,430	2,150	458	347	163
7	157	130	170	1,050	1,190	982	1,070	1,450	1,940	458	409	160
8	148	128	265	986	1,160	929	1,050	1,430	1,650	290	527	165
9	147	192	222	978	1,100	918	1,040	1,350	1,600	246	699	163
10	143	242	205	888	1,140	997	1,010	1,290	1,950	289	800	164
11	142	237	297	830	1,080	1,050	1,180	1,290	2,280	370	615	239
12	142	188	331	842	979	1,030	1,430	1,380	2,390	390	420	326
13	138	188	362	959	906	1,110	1,270	1,740	1,280	373	376	455
14	136	179	472	841	849	1,190	1,200	1,280	1,070	380	325	523
15	136	173	513	858	847	1,140	1,150	1,190	1,030	366	302	621
16	137	179	538	807	958	1,200	1,050	1,320	1,000	329	281	661
17	137	200	595	1,010	1,100	1,050	874	1,470	899	315	228	623
18	135	238	565	1,370	1,150	1,080	1,280	1,590	861	307	166	546
19	135	263	596	1,100	1,150	1,020	1,410	1,450	836	296	141	413
20	132	329	470	1,360	1,160	1,050	1,210	1,310	788	271	146	327
21	130	297	415	1,280	1,020	1,120	1,610	1,580	672	243	148	294
22	131	235	414	1,140	960	1,190	1,320	1,840	642	236	162	286
23	133	196	414	1,280	962	1,140	1,310	1,440	888	228	168	285
24	131	177	406	1,170	1,230	1,040	1,260	1,270	827	220	174	268
25	128	158	453	1,040	1,230	1,070	1,270	1,460	751	219	181	257
26	129	137	595	956	1,120	1,440	1,330	1,910	772	215	187	243
27	132	136	696	1,050	1,030	2,240	1,460	1,460	728	210	190	236
28	132	139	775	1,010	988	3,570	1,410	1,290	706	197	194	215
29	130		880	995	2,590	1,480	1,320	1,170	592	196	197	196
30	129		814	826	2,550	1,370	1,200	1,260	553	197	198	205
31	128		887		1,030		1,290	1,090		193		176

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	1.65	1.50	7	165	30	127	139	8,540	11,156
February	2.20	1.47	20	363	7	118	183	10,200	21,218
March	3.34	1.53	29	1,110	2	132	426	26,200	39,184
April	3.48	2.59	18	1,850	1	764	1,020	60,400	63,494
May	5.60	2.58	29	4,020	31	767	1,130	69,500	68,168
June	5.96	2.58	28	4,740	1	769	1,230	73,300	70,224
July	3.97	2.93	19	1,580	17	846	1,240	76,300	82,300
August	4.24	3.32	26	2,370	31	1,040	1,440	88,500	89,966
September	4.89	2.65	11	3,430	29	488	1,150	68,200	64,300
October	2.72	1.81	1	584	29	192	322	19,800	25,959
November	3.03	1.72	10	842	20	134	287	17,100	18,556
December	2.83	1.61	16	691	7	157	295	18,200	16,998
The Year	5.96	1.47		4,740		118	741	536,240	571,523

RIO GRANDE AT TORNILLO BRIDGE STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located at highway bridge two miles west of Tornillo, El Paso County, Texas, and 3.7 miles north of Guadalupe, Chihuahua. Zero of gage is 3,578.63 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 83 meter measurements during the year. Computation by shifting channel methods. 1937 records good. Records available: January, 1924, to December, 1937. Station maintained prior to August, 1928, by United States Bureau of Reclamation.

REMARKS: El Vado reservoir on the Rio Chama and Elephant Butte reservoir on the Rio Grande, as well as many irrigation diversions in Colorado, New Mexico and Texas, completely modify the river flow.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on September 5, 1925, when the mean daily flow was 6,500 second feet. The river is sometimes dry. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	168	136	*29.3	7.4	22.1	377	343	28.7	31.8	41.4	13.0	154
2	159	134	*17.5	5.6	10.1	368	218	171	14.7	26.0	19.9	171
3	165	135	*6.2	6.0	36.6	363	*170	340	6.6	18.6	8.4	163
4	157	130	*4.8	15.1	11.5	204	*101	173	2.7	11.8	40.1	161
5	165	117	*17.6	190	7.5	158	244	271	72.5	18.4	71.5	160
6	154	106	89.3	212	83.2	209	277	123	192	10.6	163	160
7	151	92.5	87.7	33.8	183	217	145	31.8	644	6.3	184	157
8	149	79.2	83.8	73.4	215	151	120	44.4	688	16.7	220	155
9	144	76.8	63.2	36.4	190	80.8	50.8	85.7	630	35.3	301	156
10	141	64.1	27.4	24.4	157	60.9	18.9	32.1	604	34.0	405	158
11	140	*14.9	*12.0	26.3	101	101	106	68.2	1,110	222	398	123
12	140	14.0	*11.3	18.2	131	92.1	271	45.5	1,740	549	255	154
13	141	12.2	23.8	3.2	59.7	92.6	258	36.8	1,680	395	171	183
14	139	24.6	52.1	6.8	20.7	165	189	27.2	590	353	168	210
15	136	46.6	87.7	7.1	27.9	103	122	48.9	481	349	185	254
16	136	74.4	94.2	2.6	29.2	85.0	45.6	31.1	453	302	151	329
17	140	65.7	38.9	3.3	48.0	76.3	106	165	554	275	130	339
18	135	92.8	34.5	5.1	36.2	68.0	*3.7	222	299	246	97.3	300
19	140	105	26.6	173	53.3	26.2	50.2	316	263	228	74.3	256
20	133	124	100	33.5	101	31.7	203	264	233	197	49.7	264
21	132	162	47.6	95.7	39.8	97.4	42.4	274	200	191	58.3	282
22	131	150	16.4	102	5.7	64.2	130	708	131	200	54.5	361
23	130	132	15.6	69.6	54.1	93.5	47.4	814	135	201	35.0	322
24	129	114	12.0	224	89.5	90.5	25.1	296	347	141	56.8	305
25	130	72.9	10.9	231	282	104	43.7	215	277	78.4	140	282
26	132	49.9	9.1	120	314	135	76.8	428	239	62.7	123	258
27	130	42.1	20.7	17.5	270	294	39.9	651	288	45.4	139	191
28	133	*29.3	19.9	*13.0	328	1,240	66.4	232	141	31.5	149	231
29	132		73.5	38.3	474	1,400	58.3	155	122	19.3	156	204
30	131		132	88.9	1,370	489	21.9	100	108	12.9	145	223
31	130		62.2		2,040		9.3	29.4		8.3		202

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	9.62	9.08	1	227	27	115	141	8,670	9,569
February	9.57	7.82	21	209	13	5.7	85.6	4,750	10,109
March	9.80	7.63	30	261	4	4.8	42.8	2,630	8,918
April	9.91	7.65	19	392	16	1.0	62.8	3,740	12,574
May	14.72	7.78	31	2,410	22	0.0	219	13,500	16,826
June	13.77	7.33	29	1,890	20	11.7	235	14,000	15,448
July	10.11	7.09	6	500	18	.7	116	7,150	21,552
August	11.26	7.13	23	976	1	1.2	207	12,700	32,381
September	13.30	7.06	13	2,050	3	*0.0	409	24,400	26,618
October	10.46	6.86	12	786	7	0.0	140	8,600	13,294
November	9.34	6.85	9	449	1	7.9	139	8,250	9,576
December	9.09	7.98	21	407	11	98.0	222	13,600	11,116
The Year	14.72	6.85		2,410		0.0	168	121,990	187,981

* Partly Estimated

RIO GRANDE AT FORT QUITMAN STATION

DESCRIPTION: Water-stage recorder located near the lower end of the El Paso-Juarez Valley, 1-1/2 miles below Old Fort Quitman and 11-1/2 miles south of Finlay, in Hudspeth County, Texas and 1-1/2 miles east of Colonia Luis Leon, Chihuahua. Zero of gage was 3,454.06 feet above mean sea level, U. S. C. & G. S. datum, prior to April 22, 1936. After this date and until January 6, 1938, this gaging station was temporarily moved a short distance several times to facilitate river rectification. On the later date the station was permanently reestablished, 1,142 feet downstream from the location prior to April 22, 1936. The zero of the new gage is 3,450.56 feet, same datum.

RECORDS: Based upon 52 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: January, 1923, to December, 1937.

REMARKS: El Vado reservoir on the Rio Chama, Elephant Butte reservoir on the Rio Grande, and many irrigation diversions in the United States and Mexico completely modify the river flow. With all closed basins eliminated, the drainage area above this station is 30,897 square miles; 30,063 being in the United States and 834 in Mexico.

COMPARATIVE FLOWS FROM PREVIOUS RECORDS: Momentary Peak: Max., about June 20, 1905, 17,000 sec. ft.ϑ Max. since Jan. 1923 2,790 sec. ft., Sept. 11, 1925. Min., frequently dry prior to Jan. 1915.** Since Jan. 1915, dry only once, March 30, 1935. Daily: Max., about 17,000 sec. ft. June 20, 1905.ϑ Since Jan. 1915, 2,600 sec. ft. average on Sept. 11, 1925. Min., frequently dry prior to Jan. 1915. Since Jan. 1915, 0.9 sec. ft. average May 31 to June 4, 1935. Monthly: Max., since Jan. 1923, 1,080 sec. ft. average in Aug. 1928. Min., frequently dry prior to Jan. 1915. Since Jan. 1923, 14.3 sec. ft. average in May 1935. Yearly: Max., since Jan. 1923, 514 sec. ft. average in 1924. Min., since Jan. 1923, 141 sec. ft. average in 1934. Two Successive Years: Max., since Jan. 1923, 487 sec. ft. average 1923 and 1924. Min., 171 sec. ft. average 1934 and 1935. Three Successive Years: Max., since Jan. 1923, 448 sec. ft. average 1923 to 1925. Min., since Jan. 1923, 183 sec. ft. average 1934 to 1936. Four Successive Years: Max., since 1923, 431 sec. ft. average 1923 to 1926. Min., since Jan. 1923, 199 sec. ft. average 1934 to 1937. Five Successive Years: Max., since Jan. 1923, 412 sec. ft. average 1923 to 1927. Min., since 1923, 218 sec. ft. average 1933 to 1937. Fifteen Years: Average 310 sec. ft.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	191	137	71.2	85.8	91.7	*1,420	620	18.9	141	308	240	259
2	173	131	73.5	62.9	97.2	*990	433	16.1	96	249	237	262
3	187	126	72.4	57.6	90.6	767	382	22.8	*77	214	263	245
4	179	124	71.1	52.0	96.3	673	297	129	*160	200	254	244
5	176	120	78.0	62.9	97.8	399	389	61.8	*120	203	260	284
6	170	122	76.4	62.6	95.1	341	470	82.6	*200	170	277	294
7	176	120	75.6	60.7	95.6	362	297	60.2	*250	160	296	281
8	189	131	57.7	73.4	118	425	151	41.0	*800	165	321	282
9	191	116	51.6	74.0	168	335	98.3	38.1	*1,000	165	352	301
10	189	109	52.6	82.5	252	223	48.3	32.0	*1,100	289	422	308
11	188	95	70.1	84.4	262	144	104	17.6	*1,400	*598	462	296
12	218	140	57.6	90.4	215	127	563	14.9	*1,100	*2,540	428	292
13	207	140	52.0	87.5	161	130	305	16.6	*1,150	*1,220	314	300
14	185	127	43.6	62.2	119	165	320	16.2	950	691	302	350
15	165	143	54.7	61.4	100	124	190	20.1	936	624	294	401
16	156	117	78.6	58.1	92.5	83.0	146	44.4	717	547	291	439
17	157	116	87.2	54.3	101	91.1	76.4	21.5	768	457	284	515
18	163	106	78.1	52.0	112	76.0	68.6	70.3	718	383	266	512
19	144	86	77.9	217	97.1	76.4	56.6	99.1	543	382	261	469
20	146	95	75.0	117	85.2	144	42.4	248	533	327	273	424
21	140	110	86.7	97.7	83.3	83.1	44.6	357	509	319	274	415
22	136	160	107	79.1	92.4	70.6	38.3	471	467	292	260	444
23	134	155	90.6	88.2	93.1	69.6	33.5	728	488	282	280	406
24	128	123	55.6	92.5	152	66.1	29.8	671	889	272	288	367
25	110	114	50.7	133	119	50.9	23.4	345	770	256	278	343
26	112	90	50.6	204	177	109	22.9	364	694	252	252	319
27	113	76	48.0	151	263	150	27.0	447	162	294	272	288
28	130	75	75.9	94.9	550	148	36.4	470	138	262	292	283
29	139		96.6	89.2	442	900	27.5	462	120	245	292	269
30	137		76.6	83.7	*581	1,070	23.2	460	117	258	288	264
31	137		72.0		*994		21.4	346		238		302

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	.70	-.15	13	249	25	106	160	9,850	11,748
February	.33	-.60	22	189	27	68.0	118	6,550	12,611
March	-.09	-.91	29	116	10	42.2	69.8	4,290	11,062
April	3.18	-.82	19	1,890	6	48.3	89.1	5,300	13,760
May	3.03	-.36	31	*1,160	20	77.2	197	12,100	17,048
June	4.60	2.25	2	*2,000	25	44.0	327	19,500	15,823
July	5.22	2.00	12	1,050	30	18.5	174	10,700	18,521
August	4.78	1.87	24	790	15	15.6	200	12,300	31,352
September	*7.10	2.70	11	*3,040	2	21.0	*570	*33,900	31,701
October	*7.60	*3.06	12	*3,100	6	*128	*415	*25,500	22,414
November	*3.93	*2.70	11	*474	2	*140	296	17,600	15,066
December	*3.93	*3.07	17	*538	3	*190	337	20,700	15,636
The Year	*7.60	-.91		*3,100		15.6	246	178,290	216,742

ϑ Estimated from peak flow at El Paso and Upper Presidio stations. April 1, 1900 to June 30, 1903, a gaging station was maintained at Fort Hancock about 45 miles upstream from Fort Quitman.

** Elephant Butte reservoir closed January, 1915.

* Partly Estimated.

RIO GRANDE AT LA NUTRIA STATION

DESCRIPTION: Water-stage recorder about 9-1/2 miles above Candelaria, Texas, 9-1/2 miles above San Antonio Chihuahua, 64 miles above Presidio, Texas and 62 miles above Ojinaga, Chihuahua. Zero of gage is 2,871.42 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 22 meter measurements by wading during the year for stages below 650 sec. ft. Station rating curve extended above 650 sec. ft. by means of areas and water surface slopes shown by maximum stage pipe gages. Computations by shifting channel methods. 1937 records good. Records available: January, 1935 to December 31, 1937. Records estimated from January 1 to June 15, 1935.

REMARKS: El Vado reservoir on the Rio Chama and Elephant Butte reservoir on the Rio Grande, as well as many irrigation diversions in the United States and Mexico, completely modify the river flow. With all closed basins eliminated the drainage area above this station is 32,739 square miles, 31,096 being in the United States, and 1,643 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on August 31, 1935 when the peak discharge was 7,480 second feet. The river is sometimes dry.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	190	123	94.9	43.0	53.2	1,010	*265	.4	188	395	204	187
2	154	129	81.6	56.4	41.8	1,140	*271	0	170	392	274	180
3	145	129	74.0	46.8	37.9	1,030	*196	0	133	336	194	181
4	166	124	72.8	36.6	33.6	534	*173	0	95.3	300	182	194
5	162	120	68.1	36.7	32.6	469	169	0	79.2	247	178	237
6	165	117	70.4	36.0	84.7	431	116	0	148	232	173	276
7	162	115	74.2	34.4	151	334	102	0	122	208	173	246
8	154	113	76.7	33.8	72.7	296	161	0	272	193	242	209
9	151	112	75.5	32.5	65.2	298	165	0	317	189	487	218
10	158	113	73.1	31.0	45.3	264	87.4	0	709	250	349	201
11	161	116	70.6	30.4	39.8	214	*164	0	1,220	305	318	205
12	161	111	60.3	29.9	97.6	159	*234	0	884	2,920	404	194
13	156	107	55.2	29.5	135	129	*329	0	1,120	4,050	448	202
14	165	95.9	49.1	28.3	128	111	*252	0	904	4,360	388	192
15	174	111	54.3	27.9	118	93.8	*132	0	947	1,080	301	217
16	172	133	54.5	27.4	89.0	81.5	*110	5.6	755	830	282	271
17	155	120	52.6	27.7	70.1	78.0	*89.0	23.4	629	680	279	368
18	144	131	47.8	27.2	48.9	58.8	*67.2	17.9	590	568	283	407
19	137	123	45.2	26.1	44.1	47.4	*52.6	139	587	486	250	470
20	145	105	47.1	106	38.9	33.8	*34.6	185	527	404	254	468
21	146	105	55.1	282	37.8	31.0	*45.2	1,170	482	372	216	439
22	136	92.2	55.3	165	38.4	29.0	*71.0	1,280	509	345	209	385
23	136	85.4	57.4	105	37.4	27.1	*30.5	610	820	310	198	413
24	135	92.2	50.5	76.4	35.6	21.9	*20.3	590	910	302	204	*445
25	134	130	49.7	58.1	64.6	16.2	*15.1	629	1,300	302	224	*398
26	131	139	58.9	44.2	40.9	12.7	*15.8	541	1,020	285	217	*351
27	125	121	56.0	48.8	87.9	10.8	*10.5	347	698	249	230	*276
28	118	102	47.3	42.4	69.9	9.7	*7.2	284	620	244	222	*272
29	111		37.1	91.5	974	9.4	*4.5	338	561	242	186	*278
30	111		37.1	82.8	1,400	27.6	*3.2	323	500	228	187	*246
31	114		35.6		1,300		*1.5	207		214		238

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1935 to 1937
January	3.63	3.01	1	221	30	108	148	9,070	*7,690
February	3.21	2.80	25	146	23	83.0	115	6,380	*5,563
March	2.93	2.31	1	101	31	34.8	59.3	3,650	*3,030
April	4.32	2.20	21	424	20	23.1	58.1	3,460	*2,180
May	6.93	2.29	30	1,770	5	29.4	178	10,900	*5,190
June	6.77	1.87	1	1,730	30	7.9	234	13,900	*8,233
July	7.53	1.94	12	1,470	31	.7	110	6,730	5,257
August	9.45		21	3,060	2-15	0	216	13,300	21,933
September	8.31	2.71	11	2,200	6	70.4	594	35,300	51,167
October	10.50	3.44	14	⊖ 5,440	9	175	694	42,700	29,167
November	5.23	3.53	8	710	6	162	259	15,400	12,967
December	4.61	3.61	19	491	2	165	286	17,600	14,967
The Year	10.50			⊖ 5,440		0	246	178,390	167,344

⊖ Slope-Area Measurement
* Partly Estimated

RIO GRANDE AT UPPER PRESIDIO STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located 7.7 river miles above the confluence of the Rio Conchos and about 10 miles northwest of the towns of Ojinaga, Chihuahua, and Presidio, Texas. Zero of gage is 2,575.82 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based on 57 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: April, 1900, to March, 1914; September, 1919, to March, 1920; August, 1923, to December, 1937.

REMARKS: El Vado reservoir on the Rio Chama and Elephant Butte reservoir on the Rio Grande, as well as many irrigation diversions in the United States and Mexico, completely modify the river flow. With all closed basins eliminated the drainage area above this station is 33,935 square miles, 31,676 being in the United States and 2,259 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on June 13, 1905, when peak discharge was 13,700 second feet. The river is sometimes dry. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	184	102	81.5	4.1	1.9	124	*15.0	1.3	*113	*460	253	189
2	180	103	82.0	2.4	1.9	651	*29.5	.8	*80.5	*376	263	192
3	164	103	79.6	3.9	1.5	1,040	201	.4	*57.0	328	357	185
4	150	104	74.5	4.3	18.0	970	119	0	41.9	291	227	185
5	141	104	73.7	2.2	5.7	850	87.2	0	117	*236	212	186
6	143	100	71.6	3.5	2.0	900	55.9	0	79.4	*189	205	197
7	143	102	65.0	1.6	1.0	800	31.7	0	38.2	*151	207	210
8	145	103	62.0	.6	1.4	289	*11.6	0	82.8	*126	204	232
9	138	98.5	57.0	.9	1.2	243	*6.0	0	106	114	222	206
10	138	93.8	51.4	2.4	1.2	195	*2.5	0	485	131	489	191
11	139	93.5	41.9	2.6	0	165	18.6	0	711	135	401	192
12	136	96.0	31.9	3.7	1.7	170	1,250	0	1,790	575	296	187
13	138	98.5	19.0	2.0	1.3	104	552	0	1,070	1,740	369	191
14	136	99.8	13.1	.2	1.3	83.6	246	0	1,320	1,850	418	201
15	135	95.2	12.9	0	1.1	65.1	261	0	1,010	1,980	392	197
16	138	90.8	9.5	0	.7	*47.7	*182	0	*1,080	2,170	319	197
17	148	86.3	8.3	3.0	.7	*33.9	*116	0	904	1,430	280	203
18	151	83.2	9.3	1.0	.7	*21.2	86.6	0	589	758	269	248
19	143	81.4	8.1	0	.5	*11.4	73.3	0	*474	662	264	294
20	133	79.8	8.0	20.0	.3	8.0	59.6	0	585	552	259	371
21	130	80.1	8.3	6.4	.5	7.4	63.6	3.1	556	481	248	386
22	127	80.4	8.2	.1	.3	*2.1	66.1	1,410	481	437	234	378
23	122	80.7	7.0	37.3	.1	*2.0	44.6	1,380	588	437	209	321
24	118	79.7	4.3	30.0	.4	*1.1	41.6	434	1,310	430	199	325
25	117	77.1	3.3	7.8	.2	*1.0	*33.6	335	903	409	192	345
26	115	76.0	4.1	5.4	*.1	*.8	*24.3	397	1,440	394	194	331
27	114	76.3	1.9	3.4	0	78.0	16.2	363	1,460	344	202	302
28	111	81.1	4.2	2.1	0	50.9	6.2	201	*734	319	196	289
29	111		7.2	1.7	0	14.8	.4	139	*674	299	212	288
30	109		7.7	2.0	0	13.8	1.2	*104	*561	283	204	277
31	104		4.2		21.1		1.3	172		261		256

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	1.71	1.23	1	190	31	102	136	8,330	12,892
February	1.27	1.01	3	106	27	74.8	91.0	5,060	11,759
March	1.05	-.07	2	82.0	31	.8	29.7	1,830	11,158
April	.92	-.15	20	59.0	19	0	5.2	307	10,814
May	.89		31	57.9	11	0	2.2	132	15,917
June	4.25	.14	2	1,380	26	.8	232	13,800	15,706
July	5.04	.01	12	2,020	30	0	119	7,300	16,801
August	4.92	0	23	1,790	4-20	0	159	9,800	37,415
September	5.68	.71	12	2,000	8	30.7	648	38,600	39,106
October	6.70	1.30	17	2,300	9	102	592	36,400	33,415
November	2.87	1.84	10	601	25	190	267	15,900	16,694
December	2.42	1.70	20	398	5	181	250	15,400	14,720
The Year	6.70	-.15		2,300		0	211	152,859	236,397

* Partly Estimated

RIO GRANDE AT LOWER PRESIDIO STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car and winch, located about 2-1/4 miles above the international highway bridge between Presidio, Texas and Ojinaga, Chihuahua, and 1-1/2 miles below the confluence of the Rio Conchos with the Rio Grande. Zero of gage is 2,556.42 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based on 57 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: May, 1900, to July, 1915; September, 1919, to March, 1920; August, 1923, to December, 1937.

REMARKS: Station moved to its present location on June 14, 1932. Previously it was located 6 miles farther downstream and 1/2 mile above the Alamito Creek confluence. See Water Bulletin Number 1 for description of the old station. The El Vado reservoir on the Rio Chama, Elephant Butte reservoir on the Rio Grande, and Boquilla reservoir on the Rio Conchos, as well as many irrigation diversions in the United States and Mexico, greatly modify the river flow. With all closed basins eliminated the drainage area above this station is 56,556 square miles of which 31,697 are in the United States and 24,859 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow occurred in September, 1904, with a peak flow estimated at 168,000 second feet at the present station. The lowest recorded flow was 3.5 second feet in May, 1904. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	973	935	936	374	161	1,030	370	331	643	4,240	945	806
2	905	962	984	319	164	3,140	317	242	464	3,560	903	666
3	1,060	962	766	276	179	1,690	411	189	389	2,590	984	626
4	976	945	739	256	776	2,260	369	158	361	2,420	765	711
5	1,100	791	677	254	341	1,440	349	135	437	2,120	657	851
6	932	954	703	252	412	1,250	324	116	311	1,420	604	1,050
7	917	940	700	204	268	1,100	275	106	221	1,550	750	1,060
8	972	812	750	184	192	1,150	227	100	238	1,220	834	1,010
9	880	1,080	761	231	166	1,120	240	91.1	318	1,230	872	999
10	918	869	862	296	142	722	231	80.5	507	1,000	990	919
11	866	1,010	900	243	230	768	483	73.2	1,970	947	935	856
12	1,030	840	982	209	266	675	2,090	61.9	5,030	2,140	858	899
13	948	818	683	194	596	519	1,450	54.2	1,970	3,410	881	925
14	955	1,030	498	194	343	503	887	50.3	2,160	2,750	877	935
15	852	1,040	500	168	374	448	1,420	44.2	1,890	2,810	878	1,140
16	707	926	555	164	323	519	1,200	33.7	2,510	2,950	908	1,020
17	1,000	879	579	148	223	597	1,200	23.2	2,640	2,410	880	970
18	941	884	668	129	181	601	1,110	1,110	2,130	1,550	772	998
19	957	847	570	131	316	380	852	195	1,760	1,470	747	1,080
20	870	803	495	131	309	324	750	208	1,990	1,290	734	1,270
21	894	994	449	143	436	305	1,200	462	2,590	1,100	689	1,360
22	825	974	428	120	349	268	868	2,230	3,190	1,130	664	1,430
23	807	989	437	148	441	297	825	2,350	4,050	1,100	736	*1,480
24	839	890	484	156	428	428	819	1,860	9,640	939	614	*1,110
25	910	872	546	135	258	396	618	1,970	11,900	1,060	574	*951
26	975	877	400	128	217	519	594	1,920	12,100	1,030	634	*1,130
27	916	1,010	320	105	318	1,310	460	1,650	11,800	1,010	624	*1,270
28	860	1,120	286	91.9	427	537	580	973	8,910	1,010	646	1,470
29	815		294	119	304	293	558	877	5,760	957	669	1,380
30	892		358	162	347	284	551	767	4,900	837	770	1,030
31	988		454		532		467	682		865		876

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal † 1924-1937
January	2.51	1.89	3	1,250	16	692	919	56,500	67,034
February	2.55	1.92	28	1,290	8	715	930	51,700	53,311
March	2.42	1.22	12	1,140	29	275	605	37,200	51,357
April	1.49	.52	1	426	27	79.4	189	11,200	41,508
May	2.98	.65	4	2,080	10	123	323	19,900	52,008
June	6.07	.93	2	6,980	29	237	829	49,300	58,461
July	4.40	.86	12	3,650	9	215	713	43,800	74,529
August	6.89	.09	22	8,880	18	19.0	618	38,000	147,640
September	*8.90	.79	24	*14,900	7	184	3,430	204,000	245,822
October	4.72	1.85	1	4,590	30	810	1,750	107,000	179,349
November	2.21	1.52	3	1,040	25	568	780	46,400	67,203
December	2.89	1.52	28	1,910	3	595	1,040	64,000	64,711
The Year	*8.90	.09		*14,900		19.0	1,010	729,000	1,102,934

* Partly Estimated

† 1924 to April, 1932 inclusive - Lower Presidio Station - Revised. See elsewhere in this Water Bulletin.

ALAMITO CREEK STATION NEAR PRESIDIO, TEXAS

DESCRIPTION: Water-stage recorder, about 1,000 feet above confluence with the Rio Grande, and six miles below Presidio, Texas and Ojinaga, Chihuahua. Zero of gage is 2,541.42 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 40 meter measurements during the year and the previous rating curve; also upon numerous estimates by the hydrographer at low flow. Computations by shifting channel methods. 1937 records good. Records available: January 1, 1932, to December 31, 1937.

REMARKS: The flow of this spring-fed creek is modified by a small irrigation reservoir 10-1/2 miles south of Marfa and by irrigation diversions. The low flow is steady, being from springs. The high flow is erratic, being from storms. The drainage area above this station is 1,504 square miles, all in the United States.

PREVIOUS EXTREME FLOWS: The greatest recorded flow occurred August 25, 1934, with a gage height of 4.04 feet and flow of 8,200 second feet. The lowest recorded flow was .87 second foot on several days in 1932. On October 2, 1932, backwater from the Rio Grande caused a gage height of 8.33 feet. This is the highest recorded gage height. On July 30, 1936, a gage height of 5.93 was recorded with a flow of 3,900 second feet.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*4.0	*4.5	*3.0	*3.5	*3.5	*3.0	*2.5	*2.5	*2.5	*3.5	*4.6	*3.0
2	*4.0	*4.5	*3.0	*3.5	*3.5	*19.1	*2.5	*2.5	*2.5	*3.5	*90.4	*3.0
3	*4.0	*4.5	*3.0	*3.5	*3.5	*5.0	*2.5	*2.5	*2.5	*3.5	*61.6	*3.0
4	*4.0	*4.5	*3.0	*3.5	*3.5	*4.0	*2.5	*2.5	66.7	*3.5	*6.7	*3.0
5	*4.5	*4.5	*3.0	*3.5	*3.5	*4.0	*2.5	*2.5	18.3	*3.5	*5.2	*3.0
6	*4.5	*4.5	*3.5	*3.5	*4.2	*3.5	*2.5	*2.5	6.6	*3.5	*4.6	*3.0
7	*4.5	*4.5	*3.5	*3.5	*4.5	*3.5	*2.5	*2.5	*3.0	*3.5	*4.0	*3.0
8	*4.5	*4.5	*3.5	*3.5	*3.5	*3.5	*2.5	*2.5	*3.0	*3.5	*4.0	*3.0
9	*4.5	*4.5	*3.5	*3.5	*3.5	*3.0	*2.5	*2.5	*3.0	*3.5	*3.6	*3.0
10	*4.5	*4.5	*3.5	*3.5	*3.5	*3.0	*2.5	*2.5	*3.0	*3.5	*3.4	*3.0
11	*4.5	*4.5	*3.5	*3.5	*3.5	*3.0	*2.5	*2.5	*7.0	*3.5	*3.4	*3.0
12	*4.5	*4.5	*3.5	*3.5	*3.5	*2.5	636	*2.5	368	*4.0	*3.6	*3.0
13	*4.5	*4.5	*3.5	*3.5	*3.5	*2.5	6.1	*2.5	14.6	1,010	*3.6	*3.0
14	*4.5	*4.5	*3.5	*3.5	*3.5	*3.0	*3.0	*2.5	*3.5	*9.0	*3.4	*3.0
15	*4.5	*4.5	*3.5	*3.5	*3.5	*2.5	33.6	*2.5	*3.0	*4.0	*3.4	*3.0
16	*4.5	*4.5	*3.5	*3.5	*3.5	19.5	114	*2.5	*3.0	*3.5	*3.4	*3.0
17	*4.5	*4.5	*3.5	*3.5	*3.5	9.8	*3.5	*2.5	*3.0	*3.5	*3.6	*3.0
18	*4.5	*4.5	*3.5	*3.5	*3.5	*3.5	*3.5	504	*3.0	*3.0	*3.6	*3.0
19	*4.5	*4.5	*3.5	*3.5	*3.5	*3.0	*3.0	31.2	*3.0	*3.0	*4.0	*3.0
20	*4.5	*3.5	*3.5	*3.5	*3.5	*2.5	385	100	*3.0	*3.0	*4.0	*3.0
21	*4.5	*3.5	*3.5	*3.5	*3.5	*2.5	195	786	*3.0	*3.0	*4.0	*3.0
22	*4.5	*3.0	*3.5	*3.5	*3.5	*2.5	18.7	426	*179	*3.0	*4.0	*3.0
23	*4.5	*3.0	*3.5	*3.5	*3.5	*2.5	51.0	666	*276	*3.0	*4.0	*3.0
24	*4.5	*3.0	*3.5	*3.5	*3.5	*2.5	*2.5	312	*120	*4.0	*4.0	*3.0
25	*4.5	*3.0	*3.5	*3.5	*3.5	*2.5	*2.5	579	*10.0	*4.0	*4.0	*3.0
26	*4.5	*3.0	*3.5	*3.5	*3.5	*3.0	*2.5	106	3.5	*4.0	*4.0	*3.0
27	*4.5	*3.0	*3.5	*3.5	*3.5	*2.5	*2.5	*3.5	*3.5	*4.0	*4.0	*3.0
28	*4.5	*3.0	*3.5	*3.5	*3.5	*2.5	*2.5	*3.0	*3.5	*4.0	*4.0	*3.0
29	*4.5		*3.5	*3.5	*3.0	*2.5	*2.5	*2.5	*3.5	*4.0	*4.0	*3.0
30	*4.5		*3.5	*3.5	*3.0	*2.5	*2.5	*2.5	*3.5	*4.0	*4.0	*3.0
31	*4.5		*3.5		*3.0		*2.5	*2.5		*4.0		*3.0

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1932 to 1937
January	2.76		23	4.7	1-4	4.0	*4.3	*265	186
February	2.75	2.69	1-18	*4.5	22-28	3.0	*4.1	*225	177
March	2.70	2.68	6-31	*3.5	1-5	*3.0	*3.4	*210	185
April	2.76	2.68	20	*4.7	11	*3.5	*3.5	*208	171
May	2.97	2.68	7	*4.5	1	*3.5	*3.5	*216	1,725
June	3.92	2.65	17	285	16	*2.0	*4.3	*256	2,234
July	5.33	2.71	20	9,670	8	*2.5	*48.4	*2,980	3,281
August	5.07	2.23	21	5,640	22	*2.5	115	*7,100	6,125
September	4.06	2.24	22	1,380	3	*2.5	37.6	*2,200	6,838
October	5.25	1.17	13	8,000	20	*3.0	36.2	*2,200	1,042
November	3.06	1.17	2	328	15	3.4	8.8	*524	265
December				*3.0		*3.0	*3.0	*184	207
The Year	5.33	1.17		9,670		*2.5	*22.7	*16,568	22,436

* Partly Estimated

TERLINGUA CREEK STATION NEAR TERLINGUA, TEXAS

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located about 12 miles south of Terlingua, Texas, and 2-1/2 miles above the confluence with the Rio Grande at the lower end of Santa Helena Canyon. Zero of gage is 2,191.04±.5 feet above mean sea level, United States Geological Survey datum.

RECORDS: Based upon 35 meter measurements, and previous rating curve. Computations by shifting channel methods. 1937 records fair. Records available: January 1, 1932, to December 31, 1937.

REMARKS: The flow of this spring-fed creek is modified by small irrigation diversions above the station. The low flow is steady, being from springs. The high flows are erratic, being from storms. The drainage area above this station is 1,070 square miles, all in the United States.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on May 24, 1935, when the extreme gage height was 17.59 feet, with a discharge of 34,900 second feet. The lowest flow recorded was on January 27 and February 3, 1935, when the discharge was .20 of a second foot.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.0	3.5	1.9	.9	1,760	6.4	4.8	3.3	*1.2	1.7	3.7
2	3.4	3.0	3.6	1.9	.9	13,170	6.6	4.4	2.5	*1.6	223	3.5
3	3.5	3.0	3.6	1.9	.9	*2,860	3.8	4.1	2.5	*2.2	134	3.7
4	3.5	3.0	3.2	2.0	.8	*511	9.3	2.6	2.8	*2.3	24.5	3.5
5	3.5	3.0	3.1	2.2	.9	*14.3	7.0	2.6	2.9	*2.4	12.3	3.2
6	3.6	3.0	3.0	2.2	.9	*3.4	5.1	2.5	1.8	*2.5	9.2	3.5
7	3.5	3.0	2.9	2.5	.8	*5.1	4.6	2.4	9.4	*2.6	8.0	3.5
8	3.5	3.0	2.9	2.5	.8	5.7	4.7	2.4	2.8	*2.8	8.2	3.5
9	3.4	3.0	2.9	2.5	.8	12.2	4.8	2.3	4.4	*3.0	8.6	3.5
10	3.5	3.0	2.9	2.3	.8	31	4.5	2.2	3.5	*3.0	7.9	3.5
11	3.5	3.0	3.0	2.4	188	51.4	6.0	2.2	20.4	*3.0	7.6	3.5
12	3.5	3.0	3.1	2.4	61.7	33.3	137	2.5	5,930	*90.8	7.3	3.5
13	3.4	3.1	3.1	2.4	3.3	41.9	101	2.8	240	2,040	7.3	*54.4
14	3.3	3.1	3.1	2.5	1.9	51.7	32.2	7.8	95.9	*395	7.4	*263
15	5.2	2.8	3.1	2.5	8.0	155	22.7	12.8	55.0	195	7.4	*167
16	3.1	2.7	3.2	2.5	5.8	147	26.1	17.4	46.4	92.7	7.4	53.2
17	3.0	2.6	3.1	2.4	2.5	352	21.5	35.1	44.7	71.0	7.5	*23.1
18	2.9	2.7	3.1	2.3	1.9	118	21.5	63.2	43.3	51.8	7.2	*17.9
19	2.9	2.8	2.9	152	15.1	*65.9	58.5	400	41.9	*30.2	6.5	*12.1
20	2.9	2.9	2.9	18.0	219	*51.5	61.3	107	39.5	*13.6	6.6	*10.4
21	2.9	3.2	2.8	14.3	332	*46.4	42.3	249	55.4	*7.0	6.2	*14.3
22	2.9	3.2	2.8	14.3	4.2	*42.4	325	173	76.0	*5.6	5.4	*296
23	2.9	3.2	2.6	8.1	4.7	*40.0	673	*717	128	*5.0	4.1	84.6
24	2.8	3.3	2.5	1.8	5.4	*34.0	458	*254	59.8	*4.4	3.6	*20.9
25	2.8	3.3	2.5	1.8	6.1	30.4	21.4	*94.2	60.5	*3.8	3.7	*17.0
26	2.8	3.4	2.4	2.0	449	26.4	10.3	*49.3	*28.0	*3.3	3.9	*15.6
27	2.8	3.4	2.4	1.8	170	22.4	7.9	*27.5	*16.2	*2.9	4.3	*15.6
28	2.8	3.5	2.3	1.8	70.6	19.0	6.3	17.7	*8.9	*2.6	4.3	*125
29	2.8		2.3	1.2	2,560	15.0	5.5	11.5	*0	*2.3	3.9	*230
30	3.0		2.0	.8	375	10.6	5.5	8.2	*0	*2.0	3.8	*63.1
31	3.0		2.0		4,300		5.1	6.2		*1.6		*28.2

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1932 - 1937
January	.52	.45	6	3.6	19	2.8	3.2	198	150
February	.48	.40	1	3.0	17	2.6	3.0	169	129
March	.46	.40	3	3.6	31	2.0	2.9	176	180
April	4.23	.40	19	1,730	1	1.9	8.6	514	205
May	15.95	.52	31	28,900	7	.8	284	17,400	8,320
June	19.50	.50	2	47,000	6	1.6	658	39,100	11,035
July	5.45	.47	23	3,060	2	2.9	67.9	4,200	3,977
August	5.50	.66	19	2,860	10	2.2	73.7	4,530	7,032
September	14.85	-.44	12	23,400	30	0	234	13,900	14,087
October	9.00	-.52	13	7,830	1	1.2	*98.3	*6,040	3,966
November	2.86	-.30	2	824	24	3.6	18.4	1,100	335
December	3.19	-.29	22	993	5	3.2	50.1	3,080	649
The Year	19.50	-.52		47,000		0	125	90,407	50,065

* Partly Estimated

RIO GRANDE AT JOHNSON RANCH STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located about 2 miles above Johnson Ranch, and about 14 miles below Castolon, Brewster County, Texas and Santa Helena ranch, Chihuahua, Mexico. Zero of the gage is 2,046.00 feet above mean sea level, United States Geological Survey datum.

RECORDS: Based upon 39 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: April, 1936 to December, 1937.

REMARKS: The river flow at this station is greatly modified by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated the drainage area above this station is 63,773 square miles; 35,710 being in the United States and 28,063 in Mexico.

PREVIOUS EXTREME FLOWS: From high water marks it was determined that a stage of 24.6 feet was reached October 3, 1932; the estimated discharge for this stage was 97,000 second feet.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	876	934	1,020	319	39.9	4,140	310	441	636	4,470	796	658
2	858	1,020	1,070	387	31.2	17,100	212	390	605	3,740	1,380	736
3	879	969	927	346	73.4	5,620	151	310	*505	3,290	2,630	691
4	910	967	909	288	75.5	4,610	151	247	*389	*2,920	1,340	611
5	1,030	994	770	262	73.5	2,390	176	214	*361	*2,570	1,220	595
6	944	954	724	247	531	1,600	201	*172	480	*2,220	1,050	739
7	1,010	898	693	238	317	1,170	197	*137	403	*1,950	889	830
8	878	980	766	224	356	1,280	193	109	385	*1,750	829	1,060
9	904	969	742	205	290	1,430	227	95.7	380	*1,500	885	1,080
10	931	939	749	182	210	1,310	167	84.9	374	*1,240	888	1,100
11	857	1,020	777	169	147	1,220	164	76.0	426	*1,040	956	1,050
12	928	937	865	246	1,010	*700	331	71.5	12,400	*842	1,020	925
13	*837	992	967	254	250	*700	2,260	62.0	4,810	6,810	846	942
14	*1,030	878	862	224	314	*620	1,560	58.9	2,430	5,850	830	1,370
15	*1,010	886	647	196	535	566	887	52.2	2,430	2,980	803	1,340
16	*896	1,070	540	183	375	954	1,340	47.8	2,220	2,900	822	1,420
17	781	967	560	171	298	1,070	1,150	44.0	2,740	3,020	813	1,390
18	840	975	544	167	294	1,740	1,070	54.0	2,680	2,520	858	1,180
19	1,010	908	578	341	228	*1,080	1,100	278	2,280	*1,600	796	1,280
20	920	907	614	700	184	*594	1,100	773	2,060	*1,320	773	1,510
21	968	840	533	178	775	403	1,300	993	2,490	*1,230	758	1,780
22	867	848	480	139	293	354	1,230	2,380	2,980	*1,180	744	2,060
23	904	1,000	456	113	369	305	1,530	3,900	6,300	1,120	736	1,790
24	823	953	424	102	375	248	1,100	2,750	5,740	1,190	730	1,820
25	824	965	425	91.4	469	238	836	3,300	12,300	1,000	699	1,650
26	906	882	453	89.4	1,220	509	725	2,640	12,500	962	632	1,340
27	915	838	486	99.6	1,350	1,390	565	2,050	12,900	1,100	609	1,220
28	1,010	912	411	84.4	*549	1,190	516	1,750	12,100	1,070	628	1,450
29	907		350	71.7	4,340	882	443	1,160	7,700	933	612	1,700
30	861		322	55.5	1,830	473	474	825	5,260	1,060	596	1,620
31	818		301		856		458	777		854		1,270

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal † 1924-1937
	High	Low	Dates		Dates				
January	*2.79	2.32	14	*1,170	18	735	907	55,800	75,889
February	2.79	2.40	11	1,150	22	768	943	52,400	59,936
March	2.82	1.67	2	1,180	31	295	644	39,600	56,397
April	3.78	1.11	19	2,350	30	48.4	212	12,600	44,260
May	7.72	1.06	29	9,850	2	28.3	583	35,800	64,418
June	12.55	1.41	2	26,000	24	228	1,860	111,000	70,386
July	4.43	1.25	13	3,280	4	116	714	43,900	84,364
August	5.71	.62	23	6,460	17	41.5	847	52,100	168,655
September	12.45	1.73	12	25,500	11	363	3,980	237,000	284,258
October	8.80	2.34	13	15,900	31	809	2,140	131,000	195,059
November	4.66	2.15	3	4,120	30	596	906	53,900	75,344
December	3.71	2.14	22	2,770	5	581	1,230	75,800	71,355
The Year	12.55	.62		26,000		28.3	1,240	900,900	1,250,321

† The figures from January, 1924 to March, 1936 which make up the Johnson Ranch normal were estimated from Boquillas and Lower Presidio.

* Partly Estimated

RIO GRANDE AT LANGTRY STATION, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand up cable car and winch, located at Langtry, Val Verde County, Texas and 62 miles above Villa Acuña, Coahuila. Zero of gage is 1,091.69 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 28 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: May, 1900, to October, 1914; December, 1919, to March, 1920; and January, 1924, to December, 1937.

REMARKS: Large reservoirs and many irrigation diversions in the United States and Mexico, greatly modify the river flow. With all closed basins eliminated, the drainage area above this station is 73,965 square miles; 42,226 being in the United States and 31,739 in Mexico.

PREVIOUS EXTREME FLOWS: The highest recorded gage height was on June 18, 1922, when the extreme gage height was 56.9 feet;the estimated discharge for this stage from extension of the rating curve was about 200,000 second feet. The lowest flow ever recorded was in May 1904, with an extreme of 270 second feet. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,530	1,300	1,220	708	428	2,480	1,370	826	*1,370	6,610	1,430	975
2	1,430	1,270	1,190	676	424	2,900	1,210	796	*1,300	5,410	1,540	986
3	1,440	1,190	1,270	638	419	13,400	930	808	1,220	4,650	1,700	966
4	1,330	1,300	1,410	616	408	17,000	754	797	1,100	4,170	1,500	997
5	1,340	1,370	1,420	593	410	6,730	695	782	1,050	3,640	2,970	1,070
6	1,280	1,350	1,330	632	410	4,400	637	751	1,170	3,050	1,970	1,090
7	1,330	1,350	1,310	631	659	*2,690	626	713	979	2,870	1,660	988
8	1,410	1,360	1,150	594	436	*1,950	634	660	822	2,710	1,560	957
9	1,340	1,350	1,080	573	455	*1,670	623	614	793	2,270	1,470	1,040
10	1,370	1,270	1,030	551	708	1,580	658	588	812	2,040	1,280	1,160
11	1,270	1,330	1,090	542	607	2,070	626	569	761	2,050	1,160	1,340
12	1,310	1,320	1,080	540	707	2,080	601	548	2,450	1,830	1,230	1,370
13	1,350	1,340	1,120	538	1,350	2,410	714	529	8,830	4,250	1,260	1,370
14	1,280	1,380	1,120	550	1,070	1,490	1,120	516	11,800	5,600	1,320	1,340
15	1,330	1,330	1,180	674	1,150	1,190	1,020	496	5,640	7,980	1,380	1,290
16	1,320	1,340	1,260	503	788	1,120	2,300	490	4,810	4,630	1,230	1,440
17	1,440	1,240	1,220	526	618	1,210	1,600	484	*2,530	3,470	1,190	1,820
18	1,350	1,270	1,050	516	590	1,210	1,320	479	*2,230	3,280	1,160	1,710
19	1,340	1,420	944	503	682	1,390	1,610	1,380	*2,250	3,350	1,170	1,660
20	1,210	1,330	871	520	610	1,860	1,380	2,000	2,990	3,060	1,150	1,440
21	1,250	1,320	871	1,960	710	1,970	1,340	1,710	2,660	2,500	1,180	1,320
22	1,360	1,250	849	1,254	935	1,370	1,460	1,620	2,170	2,150	1,160	1,380
23	1,310	1,250	880	1,050	975	1,020	1,480	5,390	2,080	1,850	1,080	1,620
24	1,340	1,200	870	706	789	853	1,780	3,450	3,040	1,640	1,060	*2,060
25	1,270	1,200	819	565	733	770	2,140	3,960	*7,960	1,620	1,060	*1,880
26	1,300	1,350	767	510	899	712	2,130	4,230	*6,870	1,630	1,040	*1,900
27	1,220	1,320	750	482	1,420	680	1,440	3,170	10,200*	1,640	1,030	*3,100
28	1,220	1,310	717	471	2,960	642	1,230	3,270	10,400*	1,490	1,050	*2,130
29	1,300		725	461	2,340	617	1,130	2,490	11,100*	1,460	1,000	*1,780
30	1,330		774	445	2,860	1,170	971	1,980	*9,740	1,540	965	*1,650
31	1,380		756		3,900		906	1,550		1,500		*1,740

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	1.59	1.19	1	1,580	21	1,160	1,330	81,900	103,627
February	1.50	1.19	13	1,470	25	1,140	1,310	72,600	84,511
March	1.48	.74	5	1,470	29	709	1,040	63,700	82,794
April	2.60	.35	21	2,880	30	433	651	38,700	71,071
May	3.92	.29	31	4,720	6	404	1,010	62,400	101,247
June	14.03	.78	4	25,900	28	615	2,690	160,000	101,391
July	2.41	.75	25	2,460	12	594	1,180	72,300	115,659
August	5.08	.46	23	6,920	17	477	1,540	94,500	208,064
September	9.63	.89	14	18,000	11	747	4,040	240,000	362,148
October	6.92	1.45	15	10,600	29	1,400	3,090	190,000	236,987
November	2.97	1.07	5	3,450	30	956	1,330	79,300	102,920
December	3.95	1.05	27	4,960	8	937	1,470	90,400	96,882
The Year	14.03	.29		25,900		404	1,720	1,245,800	1,667,301

* Partly Estimated

PECOS RIVER STATION NEAR COMSTOCK, TEXAS

DESCRIPTION: Staff-gage and cable with sit down cable car and winch, located at the Pecos high bridge of the Southern Pacific Railroad 12 miles northwest of Comstock, Val Verde County, Texas, and 5-1/2 miles above the confluence with the Rio Grande. Zero of gage is 1,058.01 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 12 meter measurements during the year. Staff-gage read twice daily and more frequently during large changes of stage. Computations by shifting channel methods. 1937 records good. Records available: March 17, 1898, to December 3, 1898; and May, 1900, to December, 1937.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by the reservoirs of the Carlsbad irrigation project in New Mexico, and the Red Bluff reservoir in Texas. With all closed basins eliminated, the drainage area above this station is 38,283 square miles, all in the United States.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on September 1, 1932, when the extreme gage height was 38.25 feet and the extreme flow was 116,000 second feet. An extreme gage height of 35.75 feet was reported on April 6, 1900, discharge based upon 1935 rating curve was 107,000 second feet. The lowest flow ever recorded was on August 31, 1930, when the extreme gage height was -0.15 foot and the extreme flow was 97 second feet. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	289	301	251	273	216	305	470	206	259	378	348	337
2	290	296	254	264	207	259	408	207	254	363	363	323
3	298	284	254	264	192	374	388	200	249	356	370	336
4	298	275	252	272	182	426	337	201	247	392	381	339
5	290	275	259	257	208	974	335	197	240	376	367	330
6	291	274	290	271	219	1,290	326	206	240	366	352	321
7	287	274	298	227	203	803	316	209	235	360	351	320
8	287	273	294	211	222	631	298	221	234	338	345	315
9	284	273	302	233	230	506	292	266	226	348	471	323
10	273	272	286	225	875	425	291	294	214	345	376	322
11	269	265	282	231	646	335	290	311	217	347	370	321
12	273	268	277	231	278	327	289	324	284	361	360	321
13	281	272	326	234	235	299	304	316	416	396	358	320
14	285	272	285	228	241	640	290	297	474	1,430	361	341
15	285	276	277	221	233	867	257	281	329	838	342	337
16	284	276	277	218	201	1,200	236	290	279	562	336	353
17	284	276	272	213	205	1,160	237	276	338	508	378	371
18	279	273	288	215	197	1,340	226	253	419	459	368	368
19	283	273	280	265	187	1,380	221	245	365	429	354	361
20	290	262	283	266	187	1,450	219	241	340	422	332	351
21	314	262	279	278	186	1,540	209	241	342	417	323	356
22	309	258	291	382	184	1,630	216	228	324	411	318	374
23	309	258	279	377	187	1,710	269	226	310	423	322	371
24	304	262	291	315	183	1,780	262	299	308	399	321	399
25	308	254	290	287	186	1,840	248	258	349	380	316	383
26	303	258	290	252	187	1,870	234	247	407	379	312	375
27	315	254	278	228	202	1,630	235	250	496	372	311	377
28	307	254	270	234	195	942	236	243	524	355	306	*666
29	310		281	231	611	698	236	232	485	349	298	517
30	314		289	232	543	543	217	239	425	343	301	518
31	322		273		342		216	269		342		530

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	.62	.46	31	326	11	269	294	18,100	23,346
February	.56	.44	1	301	28	251	270	15,000	18,301
March	.70	.44	13	357	1	251	281	17,300	18,344
April	1.02	.30	22	514	8	205	254	15,100	16,486
May	*3.87	.14	10	2,800	25	178	270	16,600	42,569
June	3.09	.42	5	2,030	2	255	972	57,900	35,239
July	.96	.30	1	486	31	210	278	17,100	19,324
August	.61	.22	12	329	5	194	251	15,400	18,495
September	1.10	.20	13	593	10	214	328	19,500	56,594
October	3.64	.48	14	2,640	8	335	437	26,900	39,912
November	1.02	.52	9	555	29	298	347	20,700	23,121
December	*1,80	.58	28	*977	8	315	373	23,000	22,817
The Year	*3.87	.14		2,800		178	363	262,600	334,548

* Partly Estimated

GOODENOUGH SPRING STATION NEAR COMSTOCK, TEXAS

DESCRIPTION: Water-stage recorder, located 4,000 feet above confluence with Rio Grande and 11-3/4 miles southwest of Comstock, Val Verde County, Texas. Zero of gage 971.91 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 12 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: February, 1929, to December, 1937. Annual discharges estimated 1924 to 1928 inclusive. See p. 52, Water Bulletin No. 6.

REMARKS: The flow of this spring channel is very uniform and is not modified by diversions or storage. When the Rio Grande reaches a flow of about 35,000 second feet near this station then back water from the Rio Grande reaches this gaging station. The surface drainage area above this station is one square mile, all in the United States.

PREVIOUS EXTREME FLOWS: The highest recorded gage height was on November 5, 1932, when the extreme gage height was 3.85 feet, discharge 742 second feet. The lowest flow ever recorded was on April 4, 1930, when the extreme gage height was 0.27 foot and the extreme flow was 93 second feet. Backwater from the Rio Grande reached gage height 13.86 on September 4, 1935.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	135	130	131	128	125	127	123	113	115	119	108	111
2	133	132	132	128	125	129	122	113	114	119	108	112
3	133	132	133	129	125	131	122	112	115	118	109	112
4	133	132	132	128	125	134	121	112	115	118	110	112
5	134	133	133	127	125	132	121	113	113	118	114	111
6	135	133	135	127	127	132	120	113	115	117	117	111
7	135	135	134	128	125	132	120	112	115	*117	120	112
8	132	133	132	125	125	132	120	112	115	*116	119	112
9	129	131	132	127	125	134	121	112	115	115	116	112
10	129	128	133	128	125	134	121	112	115	115	115	112
11	131	131	132	128	127	132	121	112	114	115	115	111
12	131	133	132	127	127	132	120	111	116	115	115	111
13	134	132	132	128	125	134	119	113	121	114	112	112
14	132	132	131	128	127	133	119	112	126	113	111	109
15	131	133	129	129	127	131	118	112	129	113	112	107
16	132	132	130	129	127	131	118	112	132	114	110	106
17	134	132	131	128	127	130	116	113	134	116	108	107
18	131	132	130	127	127	130	118	113	134	113	109	108
19	132	134	130	128	127	129	116	113	134	110	107	107
20	132	133	128	129	128	130	116	114	134	111	108	106
21	133	131	128	129	128	129	115	114	132	111	108	107
22	131	134	129	129	126	128	115	114	132	109	108	109
23	132	134	131	128	126	128	114	114	131	109	106	107
24	132	134	129	127	124	128	114	114	129	109	107	106
25	131	132	129	127	126	127	114	114	129	109	109	106
26	130	133	128	128	124	126	114	114	128	108	111	105
27	131	133	126	129	123	126	113	116	126	109	108	105
28	131	131	126	129	124	125	113	116	122	108	108	110
29	132		129	128	126	125	114	115	120	108	109	108
30	132		125	127	124	125	114	114	119	108	111	113
31	132		127		126		114	115		108		114

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	.77	.60	1	136	9	126	132	8,120	9,512
February	.62	.51	7	137	10	127	132	7,350	8,501
March	.54	.46	6	135	27	125	130	8,010	8,908
April	.52	.46	20	131	8	124	128	7,610	8,228
May	.50	.45	20	129	28	122	126	7,730	8,840
June	.57	.47	4	136	28	123	130	7,730	9,156
July	.48	.40	1	125	29	113	122	7,230	9,325
August	.44	.38	27	120	8	109	113	6,960	9,045
September	.60	.38	19	135	7	113	123	7,320	12,507
October	.50	.40	1	120	28	108	113	6,950	10,854
November	.50	.35	7	121	19	105	111	6,600	9,960
December	.64	.26	28	132	20	104	109	6,730	9,753
The Year	.77	.26		137		104	122	88,340	114,589

* Partly Estimated

DEVILS RIVER STATION NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder on main highway bridge, 12 miles northwest of Del Rio. High stage measurements from highway bridge, low stage measurements by wading. Zero of gage is 951.80 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 11 meter measurements, during the year. Computations by shifting channel methods. 1937 records good. Records available: May, 1900, to March, 1914, at a point .8 mile below Southern Pacific Railroad bridge; December, 1923, to September 1, 1932, at a point .2 mile above Southern Pacific Railroad bridge; September 2, 1932, to December 31, 1937, at highway bridge 2 miles upstream from railroad bridge.

REMARKS: The monthly flow of this spring-fed river is not modified, but the daily flow is modified by 2 power dams. The drainage area above this station is 4,060 square miles, all in the United States.

PREVIOUS EXTREME FLOWS: The highest recorded gage height was on September 1, 1932, when the extreme gage height was 41.0 feet at present station and the extreme flow was 597,000 second feet. This corresponds to a flow of 147 second feet per square mile of water shed. The lowest flow ever recorded was on November 18, 1935, when the extreme gage height was .84 foot and the extreme flow 0 second feet. Numerous records of extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	470	228	367	*216	206	510	318	304	*310	297	316	350
2	763	413	371	*228	206	386	362	347	341	293	320	339
3	344	413	392	*240	200	350	347	*300	272	294	337	325
4	448	392	392	*252	187	359	321	*300	*275	298	369	328
5	430	401	401	*265	194	394	319	*300	*275	306	341	305
6	461	412	407	277	200	394	315	*300	*275	312	390	328
7	468	401	406	286	206	340	285	*300	*275	306	400	325
8	474	401	409	301	206	458	308	*300	*275	302	406	322
9	453	467	388	303	206	1,100	325	*300	*275	316	236	317
10	455	401	386	321	235	703	332	*300	280	318	253	326
11	455	406	378	331	287	504	312	284	280	315	328	296
12	453	390	379	380	214	507	297	275	326	297	318	284
13	459	425	400	366	174	228	423	291	328	298	324	291
14	460	424	185	387	174	355	358	301	301	300	282	287
15	445	429	185	356	328	367	347	*295	305	300	298	269
16	444	357	185	352	169	329	347	*295	290	290	*314	292
17	447	346	191	354	173	184	342	*295	272	315	*313	294
18	439	350	191	371	173	183	353	*295	295	311	*313	292
19	433	362	193	323	179	236	346	*295	312	*300	*313	310
20	439	397	179	366	179	332	346	*295	302	*300	*313	367
21	440	381	175	367	178	310	346	*295	291	*300	*312	292
22	434	354	183	354	172	338	347	*295	287	*300	*312	294
23	439	357	185	300	178	346	345	*295	284	*300	*312	287
24	441	356	109	361	171	342	346	*295	290	*300	281	288
25	432	381	121	171	171	345	348	*295	292	*300	320	292
26	440	337	178	182	183	331	345	381	289	*300	326	288
27	436	404	237	195	183	333	334	288	294	*300	344	312
28	436	362	254	201	182	322	333	*310	297	*300	329	562
29	431		256	200	2,180	322	323	*310	295	*300	334	612
30	419		191	206	1,240	326	316	*310	296	*300	340	398
31	294		*203		568		340	*310		*300		379

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	1.69	.74	2	707	3	15.9	448	27,500	26,025
February	1.68	.87	15	672	26	21.4	384	21,300	23,229
March	1.58	1.04	7	539	24	94.0	273	16,800	23,960
April	1.52	1.07	23	528	6	132	294	17,500	27,464
May	4.64	.64	29	12,500	10	33.1	307	18,800	52,853
June	2.13	.82	9	1,480	4	56.4	385	22,900	50,864
July	1.57	.64	13	586	12	33.1	333	20,700	32,714
August	1.71	.90	26	748	1	92.8	*302	*18,600	26,010
September	1.42	1.13	24	397	22	169	293	17,400	125,809
October	1.55	.82	9	538	17	41.4	302	18,600	58,619
November	1.56	.68	6	557	9	21.8	323	19,200	27,711
December	1.82	.82	28	907	15	39.4	331	20,300	27,241
The Year	4.64	.64		12,500		15.9	331	239,600	502,499

* Partly Estimated

RIO GRANDE AT DEL RIO STATION

DESCRIPTION: Water-stage recorder, located 900 feet upstream from international highway bridge between Del Rio, Val Verde County, Texas and Villa Acuna, Coahuila. High stage measurements from highway bridge, low stage measurements from boat on cable at gage well. Zero of gage is 864.80 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 22 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: December, 1923, to December, 1937. Records are also available for station 11 miles upstream from May, 1900, to April, 1915; and for station 7-1/2 miles upstream at McKee's Switch from December, 1919, to March, 1920. Several small springs but no important tributaries enter the river between the various station sites.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated, the drainage area above this station is 119,611 square miles; 84,986 being in the United States and 34,625 in Mexico.

PREVIOUS EXTREME FLOWS: The highest recorded gage height was on September 1, 1932, when the extreme gage height was 34.5 feet, discharge 605,000 second feet. This is the greatest rate of discharge ever recorded at any point on the Rio Grande. (See Special Flood Report 1932 by American Section of this Commission). The lowest flow ever recorded was in May, 1930, when the extreme gage height was 1.42 foot and the extreme flow 938 second feet. Numerous records of extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,590	2,210	2,350	1,770	*1,200	5,100	2,160	1,700	2,570	9,240	2,300	1,920
2	2,640	2,350	2,280	1,720	*1,150	3,480	2,410	1,690	2,340	7,090	2,280	1,950
3	2,460	2,360	2,280	1,650	*1,150	5,330	2,210	1,630	2,010	6,160	2,470	1,970
4	2,520	2,300	2,330	*1,520	*1,200	*17,800	1,900	1,580	1,860	5,500	2,580	1,960
5	2,430	2,340	2,460	*1,460	*1,250	*13,600	1,760	1,520	2,000	5,010	2,640	1,960
6	2,440	2,440	2,560	*1,450	*1,200	*7,190	1,690	1,470	1,950	4,380	3,530	2,020
7	2,390	2,420	2,450	*1,480	*1,100	*5,530	1,620	1,430	1,850	3,800	2,850	2,070
8	2,400	2,370	2,450	*1,510	*1,200	4,270	*1,600	1,390	1,810	3,580	2,610	1,990
9	2,430	2,470	2,260	*1,430	*1,250	4,270	*1,590	1,350	1,620	3,400	2,530	1,970
10	2,340	2,390	2,180	*1,430	*1,150	3,350	*1,570	1,300	1,590	3,010	2,260	2,060
11	2,400	2,310	2,140	*1,350	1,880	2,880	1,720	1,280	1,590	2,780	2,180	2,140
12	2,350	2,380	2,130	*1,400	1,820	3,350	*1,530	1,280	1,720	2,710	2,160	2,310
13	2,390	2,390	2,170	*1,450	1,570	3,080	*1,550	1,290	4,040	2,680	2,180	2,360
14	2,410	2,390	2,200	*1,400	2,050	3,100	1,550	1,260	11,400	6,970	2,190	2,320
15	2,320	2,480	2,120	*1,350	1,980	2,770	2,010	1,220	8,060	7,490	2,260	2,290
16	2,380	2,370	2,160	*1,450	1,890	2,700	1,890	1,200	4,900	8,230	2,290	2,330
17	2,370	2,340	2,250	*1,350	1,710	2,740	2,890	1,200	3,510	6,040	2,130	2,450
18	2,440	2,260	2,240	*1,330	1,510	*2,940	2,440	1,200	3,310	*4,580	2,180	2,680
19	2,380	2,310	2,100	*1,300	1,450	*3,320	2,130	1,150	3,260	*4,010	2,220	2,620
20	2,400	2,480	2,000	*1,350	1,500	3,360	*2,400	1,820	3,160	4,060	2,120	2,690
21	2,320	2,390	1,900	*1,320	1,490	3,900	*2,200	2,520	3,800	3,520	2,080	2,460
22	2,260	2,360	1,910	2,630	*1,430	4,020	*2,160	2,460	3,450	2,940	2,040	2,320
23	2,410	2,320	1,910	2,370	1,780	3,640	2,220	2,690	3,040	2,720	2,040	2,330
24	2,400	2,320	1,920	2,080	1,710	3,340	2,330	6,010	*3,010	2,670	1,970	2,490
25	2,440	2,270	1,840	1,810	1,580	3,260	2,550	4,360	*8,800	2,520	1,950	2,850
26	2,400	2,280	1,850	*1,500	1,620	3,190	2,800	4,940	*8,000	2,390	1,940	2,740
27	2,420	2,380	1,760	*1,400	1,620	3,140	2,780	4,640	10,500	2,350	1,930	2,690
28	2,360	2,350	1,720	*1,300	2,190	2,860	2,250	3,870	10,800	2,360	1,930	3,810
29	2,340		1,750	*1,250	5,160	2,190	2,020	3,860	11,200	2,240	1,950	3,310
30	2,420		1,710	*1,200	5,540	1,900	1,920	3,570	10,500	2,230	1,930	4,190
31	2,400		1,760		4,460		1,790	2,860		2,320		2,960

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	1.58	1.13	18	2,790	29	2,060	2,410	148,000	177,769
February	1.57	1.12	15	2,790	11	2,030	2,360	131,000	148,034
March	1.52	.75	6	2,740	30	1,470	2,100	129,000	149,826
April	1.81	*.40	22	3,240	30	1,110	*1,530	*91,300	136,974
May	5.46	.38	29	12,600	10	1,080	1,860	115,000	222,004
June	*8.00	.89	4	*21,800	30	1,760	4,390	261,000	223,574
July	1.65	*.60	17	3,060	13	*1,450	2,050	126,000	189,886
August	3.48	.40	24	7,130	20	1,210	2,250	138,000	272,884
September	6.94	.52	26	*17,000	12	1,310	4,590	273,000	603,076
October	*5.49	1.02	16	*12,800	30	2,080	4,160	256,000	382,426
November	2.04	.76	6	4,020	24	1,740	2,260	134,000	182,408
December	3.20	.76	28	6,310	1	1,800	2,460	151,000	173,439
The Year	*8.00	.38		*21,800		1,080	2,700	1,953,300	2,862,299

* Partly Estimated

SAN FELIPE CREEK STATION NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder at Silos farm road bridge 1-3/4 mile south of Del Rio, Texas, 2 miles above the confluence with the Rio Grande, and 4 miles below the Del Rio gaging station on the Rio Grande. Zero of gage is 875.05 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 12 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: September 1, 1931, to December 31, 1937.

REMARKS: The flow of this spring-fed creek is greatly modified by irrigation and municipal diversions above this station. The drainage area above this station is 62 square miles, all in the United States.

PREVIOUS EXTREME FLOWS: The highest previous recorded flow was on June 14, 1935, when a flow of 45,000 second feet was reached with a gage of 23.20 feet. With spring flow eliminated this storm flow corresponds to 72 second feet per square mile of water shed. The lowest flow was 2.2 second feet on December 19, 1934. Backwater from the Rio Grande reached a gage height of 15.05 feet on September 1, 1932.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	63.7	83.8	*43.9	52.1	33.4	41.9	32.6	33.7	32.6	*30.9	24.4	22.3
2	65.8	83.8	44.6	52.1	34.2	41.7	31.9	33.9	31.5	*30.0	177	22.3
3	70.2	83.9	45.5	55.0	36.6	40.7	31.9	34.9	31.7	*29.4	33.9	22.3
4	78.3	65.9	45.5	55.9	35.9	39.6	33.5	34.4	35.3	*29.3	33.1	23.4
5	96.8	53.2	47.1	55.8	36.7	40.4	35.2	33.0	35.3	*29.3	38.1	23.4
6	96.8	57.0	51.9	56.8	36.8	41.1	36.9	33.2	34.0	*29.3	39.6	*23.4
7	90.7	59.1	48.9	57.9	40.0	41.8	36.2	33.4	36.6	*28.7	38.7	*23.3
8	87.0	60.2	47.9	54.9	38.4	39.9	39.7	33.7	34.5	*28.6	40.2	*22.1
9	87.0	62.3	47.9	49.0	39.2	40.7	41.5	33.9	33.9	*28.6	*39.3	*21.5
10	85.7	51.9	49.7	50.9	38.4	39.6	42.5	34.1	34.5	*28.6	*39.2	*20.3
11	85.7	43.3	50.7	53.8	39.3	39.5	41.7	34.3	36.6	*28.0	*39.1	*19.7
12	89.5	48.6	52.7	55.7	39.3	41.0	40.8	36.2	45.0	*28.0	*39.0	*19.7
13	89.5	46.9	51.6	56.7	42.9	42.7	40.1	37.2	37.2	*27.9	*38.9	20.3
14	88.3	43.5	52.6	58.7	40.3	44.2	40.2	38.2	34.4	*27.9	*38.8	20.5
15	*88.3	46.1	53.5	57.7	41.2	43.2	38.4	39.9	34.4	*27.9	39.5	21.2
16	*88.3	43.5	53.4	52.7	39.5	37.8	36.8	45.4	35.1	26.7	34.7	32.2
17	*88.3	44.3	53.4	50.8	37.3	35.1	35.2	38.1	33.7	29.0	33.1	30.9
18	*88.3	44.3	52.4	50.9	37.3	34.1	34.4	35.9	33.7	27.8	28.3	31.0
19	*88.3	41.5	52.4	52.8	36.3	33.2	34.5	40.8	37.1	26.6	28.9	34.8
20	*88.3	45.9	52.4	46.2	35.4	34.6	37.1	44.4	35.7	25.9	28.9	34.1
21	*88.3	49.5	52.4	47.1	36.8	32.2	37.1	42.1	34.3	25.9	28.2	45.7
22	92.0	53.3	54.2	52.1	35.9	29.6	38.0	49.3	34.9	28.9	24.4	49.2
23	95.7	50.3	55.2	55.9	37.2	28.9	39.0	45.1	34.9	27.7	19.7	35.3
24	95.7	44.9	54.2	56.0	36.4	28.9	37.3	47.9	33.6	28.8	19.2	38.5
25	94.6	47.4	55.2	57.0	34.6	29.8	38.2	57.5	36.3	30.0	19.2	40.9
26	95.8	49.3	56.1	49.2	35.3	28.4	38.3	51.0	38.6	26.2	28.4	46.1
27	92.3	49.3	57.0	44.8	35.1	29.1	39.2	33.5	33.5	26.1	30.3	49.8
28	82.3	46.5	58.1	49.3	40.7	30.0	37.6	34.4	30.0	24.2	21.2	344
29	83.7		58.1	42.3	40.5	31.7	35.3	30.6	*31.4	24.1	21.8	58.9
30	83.7		56.0	34.9	36.2	30.9	33.2	30.1	*32.8	24.6	21.7	53.8
31	83.7		54.0		37.6		32.7	33.7		26.3		*67.0

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1931 to 1937
January	1.56	1.24	6	99.1	1	61.5	86.9	5,340	4,444
February	1.44	.99	1	85.0	11	39.0	53.6	2,970	3,224
March	1.22	1.03	6	59.8	1	42.1	51.9	3,190	3,027
April	1.29	.87	15	66.1	30	28.9	52.2	3,100	2,969
May	1.11	.87	14	49.1	1	29.0	37.6	2,310	3,995
June	1.13	.88	7	48.2	23	25.2	36.4	2,170	10,583
July	1.10	.94	11	44.3	1	30.2	37.0	2,280	3,460
August	1.39	.80	25	82.4	29	29.2	38.2	2,350	3,457
September	1.12	.75	11	55.7	28	27.0	34.8	2,070	6,456
October	1.54	.61	10	102	28	18.4	27.8	1,710	3,884
November	7.33	.66	2	2,090	24	18.7	36.2	2,200	3,445
December	5.40	*.69	28	1,080	11	*19.7	42.5	2,610	3,585
The Year	7.33	.61		2,090		18.4	44.6	32,300	52,529

* Partly Estimated

PINTO CREEK STATION NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder, cable with sit down cable car, and concrete control dam, 500 feet above Del Rio-Eagle Pass highway and 5-1/2 miles above confluence with Rio Grande. Zero of gage is 854.61 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 2 meter measurements and permanent rating curve. 1937 records good. Records available: November, 1928, to December, 1937.

REMARKS: The flow of this spring-fed creek is modified by small irrigation diversions above the station. The drainage area above this station is 229 square miles, all in the United States.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on August 31, 1932, when the extreme gage height was 21.08 feet and the extreme flow 54,650 second feet. This corresponds to a flood flow of 239 second feet per square mile of water shed. The creek is often dry.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*13.0	*11.5	6.7	*4.6	2.0	5.7	2.5	0	0	0	0	0
2	*12.6	*11.0	6.7	*4.5	1.9	8.1	1.9	0	0	0	0	0
3	*12.6	*11.0	7.4	*4.3	1.8	7.6	1.7	0	0	0	0	0
4	*12.6	*10.6	*7.6	*4.2	1.6	11.0	1.5	0	0	0	0	0
5	*12.2	*10.6	*7.6	*4.0	1.6	4.3	1.3	0	0	0	0	0
6	*12.2	*10.3	*7.6	*3.9	1.4	3.0	1.1	0	0	0	0	0
7	*11.8	*10.3	*7.4	*3.7	1.9	2.4	1.0	0	0	0	0	0
8	*11.8	9.3	*7.4	*3.6	1.9	2.2	1.9	0	0	0	0	0
9	*11.5	8.4	*7.4	*3.5	1.7	2.2	3.7	0	0	0	0	0
10	*11.5	7.9	*7.1	*3.4	1.8	2.2	2.4	0	0	0	0	0
11	11.5	7.6	*7.1	*3.2	1.3	2.1	2.0	0	0	0	0	0
12	11.8	7.4	*7.1	*3.1	1.3	2.0	1.9	0	0	0	0	0
13	12.2	7.4	7.1	*3.0	1.6	1.9	1.7	0	0	0	0	0
14	12.6	7.4	6.5	*2.9	1.9	1.8	1.5	0	0	0	0	0
15	12.6	7.4	6.3	2.8	1.8	1.8	1.3	0	0	0	0	0
16	11.5	6.9	6.5	2.6	1.7	1.6	1.1	0	0	0	0	0
17	11.0	6.7	6.9	2.4	1.5	1.5	1.0	0	0	0	0	0
18	11.0	6.7	7.4	2.3	1.4	1.3	.8	0	0	0	0	0
19	11.8	6.9	7.6	2.4	1.4	1.2	.7	0	0	0	0	0
20	11.8	6.9	7.6	2.3	1.3	1.0	.6	0	0	0	0	0
21	11.8	5.9	6.7	2.4	1.3	.9	.5	0	0	0	0	0
22	11.5	6.3	6.7	2.2	1.3	.6	.4	0	0	0	0	0
23	10.6	6.5	7.1	2.2	1.3	.6	.3	0	0	0	0	0
24	10.6	6.5	6.7	2.2	1.3	.5	.2	0	0	0	0	0
25	*10.6	6.5	6.3	2.1	1.2	.4	.2	0	0	0	0	*1.0
26	*11.0	6.7	5.7	2.1	1.1	.3	.1	0	0	0	0	*1.0
27	*11.5	6.9	5.6	2.1	1.1	.2	.1	0	0	0	0	*1.0
28	*12.2	6.9	5.6	2.1	1.3	.2	.1	0	0	0	0	253*
29	*11.8		5.0	2.1	8.3	3.5	0	0	0	0	0	*11.1
30	*11.8		*5.0	"2.0	4.1	2.7	0	0	0	0	0	*7.5
31	*11.5		*5.0		6.1		0	0		0		*7.0

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1928 to 1937
January	*3.45	3.38	1	*13.6	23	10.6	*11.8	*723	665
February	*3.40	3.19	1	*11.5	21	5.7	8.0	445	552
March	3.30	*3.14	19	8.1	31	*5.0	6.7	413	769
April	*3.11	2.38	1	*4.7	30	"2.0	*2.9	*175	884
May	4.15	1.60	29	158	27	1.1	2.0	121	3,339
June	3.10	1.05	29	4.6	28	.2	2.5	149	3,898
July	3.05		9	4.4	29-31	0	1.1	66.4	1,352
August						0	0	0	5,673
September						0	0	0	3,430
October						0	0	0	1,385
November						0	0	0	622
December	*6.60		28	*2,300	1-24	0	9.1	559	746
The Year	*6.60			*2,300			3.7	2,651.4	23,315

* Partly Estimated
" Estimated

RIO SAN DIEGO STATION AT JIMENEZ, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit down cable car. Masonry Cipoletti weir control for measuring discharges up to 617 second feet. The station is located 4.4 miles west of Jimenez, Coahuila, and five miles above the confluence with the Rio Grande.

RECORDS: Based upon 42 meter measurements and the weir discharge table. Records for 1937 good. Records available: 1924 to 1937.

REMARKS: This station was constructed by the Mexican Section of the Commission and completed in November, 1932. From 1924 to 1932 there was a staff-gage at Paso del Salto, 3.1 miles upstream from the present station. Readings were made by agents of the Department of Agriculture, Monterrey, N. L. There is another gaging station on Rio San Diego at "Cabeceras", 31 miles upstream from the present station which is operated by the Mexican National Irrigation Commission. The flow of this spring-fed stream is modified by small storage reservoirs at San Miguel and Centenario on the National Irrigation System No. 6 at San Carlos, Coahuila, and by irrigation of Dolores Hacienda just above this station. One-fourth mile downstream from this gaging station water is diverted for the Jimenez Community. The drainage area above this station is 840 square miles, entirely in Mexico.

PREVIOUS EXTREME FLOWS: From reports by local inhabitants, the water level in 1905 reached a height of 20.67 feet on the present gage scale, the discharge being unknown. The stream never runs dry. The lowest flow recorded was 15.9 second feet on June 20, 1934.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	75.2	66.8	66.8	58.6	44.2	58.6	20.5	31.4	37.8	37.8	31.4	51.2
2	66.8	66.8	66.8	51.2	44.2	51.2	25.8	31.4	37.8	31.4	31.4	51.2
3	75.2	66.8	66.8	51.2	44.1	51.2	25.8	31.4	44.1	31.4	31.4	44.2
4	75.2	58.6	66.8	51.2	37.8	44.1	31.4	25.8	37.8	31.4	31.4	51.2
5	75.2	51.2	66.7	51.2	31.4	44.1	31.4	25.8	37.8	25.8	37.8	51.2
6	75.2	51.2	66.7	51.2	37.8	44.1	31.4	25.8	44.1	31.4	37.8	51.2
7	75.2	51.2	66.7	51.2	57.2	44.1	31.4	31.4	44.1	25.8	37.8	44.2
8	75.2	51.2	66.7	44.2	58.6	37.8	31.5	31.4	44.1	20.5	37.8	44.2
9	84.0	51.2	66.7	44.2	58.6	37.8	31.4	31.4	37.8	20.5	37.8	44.1
10	84.0	51.2	66.7	51.2	58.6	44.1	31.4	31.4	37.8	20.5	37.8	44.1
11	75.2	51.2	66.7	51.2	58.6	44.1	31.4	31.4	37.8	25.8	37.8	44.1
12	75.2	51.2	66.7	51.2	58.6	31.4	31.4	31.4	37.8	31.4	37.8	44.1
13	66.8	51.2	66.7	51.2	58.6	20.5	31.4	31.5	37.8	31.4	37.8	44.1
14	66.8	51.2	66.7	51.2	58.6	15.9	37.8	37.8	37.8	25.8	37.8	44.1
15	75.2	51.2	75.2	51.2	58.6	20.5	37.8	31.4	37.8	31.4	37.8	44.1
16	66.8	51.2	66.7	51.2	58.6	20.5	37.8	37.8	37.8	25.8	44.1	51.2
17	66.8	51.2	66.7	51.2	51.2	25.8	37.8	37.8	37.8	31.4	37.8	44.1
18	66.8	51.2	104	44.2	44.2	25.8	37.8	37.8	44.1	31.4	25.8	44.1
19	66.8	51.2	75.2	44.2	44.2	25.8	37.8	31.5	44.1	37.8	25.8	44.1
20	66.8	51.2	58.6	51.2	44.2	25.8	37.8	31.5	44.2	37.8	31.4	44.1
21	66.8	51.2	51.2	51.2	44.1	25.8	37.8	31.4	44.2	37.8	31.4	51.2
22	66.8	58.6	51.2	51.2	44.1	25.8	44.2	31.4	44.2	37.8	37.8	51.2
23	66.8	58.6	58.6	51.2	44.1	25.8	44.2	37.8	44.2	37.8	37.8	58.6
24	58.6	58.6	58.6	58.6	44.1	20.5	44.2	37.8	44.2	44.2	37.8	51.2
25	66.7	58.6	58.6	58.6	44.1	20.5	31.4	37.8	44.2	37.8	44.1	44.2
26	66.7	66.7	58.6	51.2	44.2	25.8	25.8	37.8	44.1	44.2	11.7	44.1
27	66.7	66.8	58.6	51.2	44.2	25.8	31.4	37.8	44.1	37.8	37.8	44.1
28	66.7	66.8	58.6	51.2	44.2	25.8	31.4	37.8	44.1	31.4	37.8	114
29	66.7		58.6	51.2	84.1	20.5	31.4	31.4	44.1	25.8	37.8	104
30	66.7		51.2	51.2	84.1	20.5	31.4	31.4	44.1	31.4	44.1	75.2
31	66.7		58.6		66.7		31.4	31.4		31.4		58.6

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1933 to 1937
January	2.13	2.03	9	84.0	24	58.6	70.3	4,320	12,930
February	2.10	2.00	1	75.2	5	51.2	55.9	3,100	8,566
March	2.33	2.00	17	149	21	51.2	64.6	3,970	8,054
April	2.03	1.94	23	58.6	30	37.8	51.0	3,040	8,522
May	2.53	1.90	29	231	5	31.4	51.3	3,150	29,776
June	2.03	1.77	1	58.6	14	11.7	31.7	1,880	18,904
July	2.00	1.84	23	51.2	1	20.5	33.4	2,050	9,228
August	1.94	1.87	17	37.8	4	25.8	32.9	2,020	10,044
September	2.00	1.90	29	51.2	1	31.4	41.4	2,460	19,496
October	1.97	1.84	26	44.1	9	20.5	31.7	1,950	33,352
November	2.00	1.71	30	51.2	26	4.9	35.5	2,110	18,633
December	2.92	1.94	28	420	13	37.8	52.3	3,220	13,443
The Year	2.92	1.71		420		4.9	46.0	33,270	190,948

RIO SAN RODRIGO STATION NEAR EL MORAL, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located 11.2 miles west of the town of El Moral, Coahuila, 19.9 miles northward from Piedras Negras and 11.8 miles above the confluence with the Rio Grande.

RECORDS: Based upon 50 meter measurements. Computations by shifting channel methods. 1937 records good. Records available: 1922 to 1937.

REMARKS: From 1922 to 1932 there were made daily 3 staff-gage readings at this station by agents of the Mexican Department of Agriculture at Monterrey, N. L. This station was constructed by the Mexican Section of the Commission and completed in October, 1932. Meter measurements began August 4, 1932. The automatic water-stage record began November 8, the same year. The flow of this spring-fed river is modified by irrigation diversions at El Remolino, 27.3 miles upstream. At Casa Roja, 7.5 miles downstream, some water is diverted for irrigation. The drainage area above this station is 750 square miles, entirely in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on September 7, 1932, when the extreme gage height was 16.08 feet and the extreme flow 81,200 second feet. The lowest recorded flow since January, 1932, occurred July 21, 1934, when discharge was 1.4 second feet.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	50.1	36.4	27.9	25.8	18.4	36.4	1.8	.4	1.0	11.6	11.7	17.3
2	46.2	36.3	27.9	25.8	18.4	36.4	1.4	.4	1.0	9.9	11.7	23.7
3	46.2	31.8	31.8	23.7	14.8	27.9	1.4	.4	.7	8.5	11.7	19.8
4	46.2	31.8	31.8	23.7	14.8	23.7	1.1	.4	.7	9.9	11.7	17.3
5	46.2	31.8	31.8	22.3	16.6	20.8	.7	.4	1.0	9.9	11.7	17.3
6	46.2	31.8	31.8	22.3	18.4	19.4	1.4	.4	1.0	9.9	11.6	14.8
7	46.2	31.8	27.9	22.3	19.4	18.4	2.1	.3	.7	9.9	11.6	14.8
8	41.0	31.8	27.9	22.3	19.4	18.4	2.5	.3	.7	9.9	11.6	12.8
9	41.0	31.8	25.8	22.2	18.4	16.6	5.7	.3	.4	9.9	9.2	12.7
10	41.0	31.7	25.8	22.2	16.6	14.8	6.7	0	.4	9.9	9.2	12.7
11	46.2	27.9	25.8	22.2	16.6	14.8	6.7	0	.4	15.9	9.2	14.8
12	41.0	27.9	25.8	22.2	16.6	13.1	5.7	0	11.7	15.9	9.2	14.8
13	41.0	27.9	25.8	23.7	16.6	13.1	3.9	0	18.4	15.9	7.4	14.8
14	41.0	27.9	25.8	23.7	16.6	11.7	3.2	0	23.6	15.9	7.4	14.8
15	41.0	31.8	25.8	22.3	14.8	11.7	2.5	0	15.9	13.8	7.4	14.8
16	41.0	36.4	25.8	22.3	13.1	11.7	2.4	0	13.8	13.8	7.4	23.7
17	41.0	31.8	25.8	20.8	13.0	11.6	2.1	0	13.8	25.8	7.4	23.7
18	36.4	36.4	25.8	20.8	13.0	10.6	2.1	0	11.7	23.6	7.4	17.3
19	36.4	31.8	25.8	22.2	13.0	10.6	1.8	0	11.6	18.4	7.4	14.8
20	36.4	31.8	23.7	22.3	11.7	3.2	1.8	0	11.6	15.9	7.4	14.8
21	36.4	27.9	23.7	20.8	11.7	3.2	1.7	0	9.9	13.8	7.4	19.8
22	36.4	27.9	23.7	20.8	11.6	2.5	1.7	.7	9.9	13.8	10.6	19.8
23	36.4	27.9	23.6	19.4	11.6	2.5	1.4	2.5	9.9	11.6	10.6	19.8
24	36.4	27.9	22.2	19.4	11.6	2.5	.7	2.4	9.9	11.6	10.6	19.8
25	36.4	31.7	22.2	19.4	10.6	2.1	.7	2.1	9.9	13.8	10.6	17.3
26	36.4	31.8	22.2	19.4	10.6	2.1	.7	1.8	9.9	13.8	10.6	17.3
27	36.4	31.7	22.2	19.4	10.6	1.7	.7	1.4	9.9	11.7	10.6	17.3
28	36.4	27.9	22.2	19.4	11.7	1.7	.7	1.4	9.9	11.6	10.6	17.3
29	36.4		22.2	19.4	14.8	1.7	.7	1.4	9.9	11.6	10.6	17.3
30	36.3		22.2	19.4	157	1.7	.7	1.4	8.5	11.6	12.7	17.3
31	36.3		22.2		73.8		.4	1.4		11.6		17.3

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Average 1932 to 1937
	High	Low	Dates		Dates				
January	1.51	1.41	1	50.1	26	36.4	40.4	2,480	5,383
February	1.41	1.35	1	36.4	13	27.9	31.2	1,730	3,767
March	1.38	1.21	6	31.8	31	20.8	25.6	1,580	3,712
April	1.31	1.15	2	25.8	25	18.4	21.7	1,290	3,167
May	2.59	.98	30	367	26	10.6	21.2	1,300	9,978
June	1.51	.82	2	50.1	30	1.4	12.2	727	8,544
July	1.12	.62	9	16.6	31	.4	2.2	133	3,936
August	.98	0.00	23	2.5	27	0.0	.6	39.3	3,152
September	2.00	.56	12	147	11	.4	7.9	471	47,332
October	1.41	1.05	17	36.4	4	8.5	13.2	815	17,401
November	1.15	1.05	30	12.7	11	7.4	9.8	584	7,147
December	1.31	1.15	16	68.9	8	12.7	17.2	1,050	5,852
The Year	2.59	0.00		367		0.0	16.9	12,199.3	119,371

RIO GRANDE AT EAGLE PASS STATION

DESCRIPTION: Water-stage recorder and cable with stand up cable car and winch, located 1/2 mile above the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. Zero of gage is 682.91 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 27 meter measurements. Computations by shifting channel methods. 1937 records good. Records available: May, 1900, to April, 1916; November, 1923, to December, 1937.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated the drainage area above this station is 123,409 square miles; 86,490 being in the United States and 36,919 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on September 2, 1932, when the extreme gage height was 49.00 feet, discharge 569,000 second feet. The lowest flow ever recorded was on May 14, 1935, when the extreme gage height was 2.85 feet and the extreme flow 924 second feet. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,660	2,480	2,350	1,870	1,340	4,920	*2,100	1,730	2,830	10,500	2,440	2,060
2	2,740	2,320	2,410	1,860	1,330	4,960	*1,920	1,720	2,680	8,730	2,410	2,140
3	2,730	2,460	2,340	1,800	1,290	3,330	*2,150	1,520	2,450	7,340	2,600	2,130
4	2,570	2,460	2,320	1,770	1,270	11,000	*2,400	1,520	2,120	*5,900	2,570	2,140
5	2,680	2,360	2,410	1,570	1,350	20,400	*2,200	1,490	2,030	*5,200	2,650	2,130
6	2,600	2,430	2,630	1,470	1,370	9,530	*1,950	1,510	1,940	*4,850	3,030	2,080
7	2,640	2,510	2,650	1,490	1,300	8,090	*1,800	1,420	1,920	*4,300	3,550	2,150
8	2,590	2,510	2,580	1,750	1,210	5,240	*1,680	1,380	1,910	*3,700	2,900	2,200
9	2,560	2,440	2,490	1,720	1,360	4,320	*1,600	1,400	1,740	*3,500	2,640	*2,060
10	2,580	2,570	2,290	1,640	1,440	4,380	*1,600	1,310	1,540	*3,370	2,470	*2,180
11	2,570	2,460	2,220	1,630	1,230	3,410	*1,600	1,280	1,480	3,000	2,150	*2,210
12	2,610	2,380	2,210	1,410	1,840	2,980	*1,550	1,270	2,010	2,890	2,140	*2,280
13	2,560	2,450	2,230	1,500	2,030	3,370	1,400	1,270	2,060	2,920	2,080	*2,350
14	2,630	2,430	2,280	1,570	1,770	3,230	1,390	1,270	5,820	3,350	2,160	*2,420
15	2,590	2,490	2,270	1,520	2,150	*2,950	1,410	1,260	11,600	8,450	2,200	2,450
16	2,480	2,490	2,270	1,460	2,140	*2,710	1,880	1,250	6,950	9,390	2,300	2,480
17	2,540	2,430	2,210	1,600	2,070	*2,590	1,800	1,210	*5,080	7,070	2,320	2,530
18	2,540	2,430	2,210	1,490	1,850	*2,650	2,880	1,120	3,720	5,780	2,160	2,600
19	2,590	2,320	2,350	1,430	1,610	*2,900	2,380	1,060	3,680	4,610	2,200	2,830
20	2,540	2,390	2,130	1,410	1,490	*3,200	2,110	1,060	3,580	4,450	2,300	2,760
21	2,560	2,480	2,030	1,520	1,500	*3,300	2,330	1,560	3,880	4,350	2,240	2,860
22	2,430	2,420	1,980	1,490	1,500	*3,800	2,130	2,630	3,720	4,000	2,210	2,770
23	2,390	2,400	1,950	2,790	1,420	*3,900	2,030	2,580	3,410	3,490	2,140	2,490
24	2,570	2,330	2,020	2,430	1,760	*3,600	2,190	3,840	3,020	3,190	2,140	2,510
25	2,540	2,320	2,010	2,190	1,680	*3,300	2,320	5,230	3,050	3,210	2,080	2,760
26	2,540	2,260	1,940	1,880	1,610	*3,150	2,620	4,510	7,600	2,900	2,080	3,170
27	2,520	2,340	2,010	1,630	1,680	*3,100	2,880	5,300	7,560	2,670	2,070	3,040
28	2,560	2,410	2,000	1,500	1,590	*3,050	2,790	4,390	*10,400	2,630	2,020	3,160
29	2,510		1,900	1,430	2,310	*2,750	2,270	4,550	*10,800	2,600	2,010	6,080
30	2,490		1,900	1,370	7,440	2,180	2,020	3,640	*11,000	2,440	2,070	4,230
31	2,550		1,820		5,080		1,890	3,070		2,420		4,670

Month	Extreme Gage Height — Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	3.93	3.40	2	3,030	23	2,110	2,570	158,000	198,837
February	3.78	3.38	15	2,820	12	2,100	2,420	134,000	161,435
March	3.78	3.02	6	2,790	31	1,570	2,210	136,000	162,072
April	3.88	2.63	23	3,340	13	1,000	1,670	99,600	150,358
May	6.84	2.35	30	11,700	12	722	1,900	117,000	270,424
June	10.20	3.16	5	24,600	30	1,850	4,610	*274,000	277,593
July	3.84	2.75	27	3,260	13	1,230	2,040	*125,000	214,335
August	5.37	2.22	24	7,010	19	632	2,200	136,000	291,365
September	8.02	2.74	15	15,200	11	1,350	4,390	261,000	642,282
October	*7.17	3.37	1	12,300	31	2,210	4,620	284,000	437,765
November	4.30	3.07	6	4,150	22	1,720	2,340	139,000	215,716
December	5.68	3.14	29	7,580	1	1,900	2,710	166,000	197,524
The Year	10.20	2.22		24,600		632	2,800	2,029,600	3,219,706

* Partly Estimated

RIO ESCONDIDO STATION AT VILLA FUENTE, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located 3.1 miles southwest of the City of Piedras Negras on the outskirts of Villa de Fuente, 5 miles above the confluence with the Rio Grande and 5.6 miles below the confluence of the Rio San Antonio. Zero of gage is 717.78 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 105 meter measurements. Computations by shifting channel methods. For discharges at stages above 3.28 feet the calculations were based upon measurements taken in 1934, 1935 and 1936, as no measurements were made of the crest of the night of May 30, 31. 1937 records good. Records available: 1922 to 1937.

REMARKS: From 1922 to 1932 there were made daily 3 staff-gage readings 2,300 feet downstream from the present station by Agents of the Mexican Department of Agriculture at Monterrey, N.L. The elevation of the zero of this old gage was 0.79 foot above the zero of the gage at the present station,but the water surface is practically level between the two gages. The present station was constructed by the Mexican Section of this Commission and completed in September, 1932. The flow of this spring-fed stream is modified by irrigation diversions in the drainage basins of the San Antonio and the Escondido. The drainage area above this station is 1,170 square miles, entirely in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow since January, 1932, was May 14, 1935, when the extreme gage height was 17.06 feet and the extreme discharge was 17,700 second feet. The lowest recorded flow occurred November 4, 1934, when the extreme gage height was .75 foot and extreme flow was .35 second feet.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	54.4	23.3	19.8	23.0	6.7	106	8.1	2.4	2.5	8.5	3.2	7.1
2	54.4	27.5	22.9	26.9	6.7	74.9	5.0	2.4	2.5	9.5	4.2	6.7
3	54.4	25.4	22.9	29.7	6.7	82.6	5.0	2.4	3.9	10.6	16.6	6.7
4	43.8	23.3	22.9	26.8	6.7	71.3	6.7	2.4	3.9	9.9	9.9	7.1
5	38.1	23.3	24.7	26.8	6.7	49.4	10.6	2.5	3.9	9.9	8.5	6.7
6	35.4	23.3	24.7	26.8	7.8	38.1	8.1	2.5	2.5	10.9	4.3	6.7
7	32.5	23.2	24.7	24.7	7.8	33.5	5.0	2.5	2.5	9.9	4.3	6.7
8	35.4	21.5	21.2	29.7	6.7	25.4	8.1	2.5	2.5	8.5	4.2	7.1
9	38.1	23.3	21.2	32.8	6.7	14.5	11.7	2.5	2.5	8.5	3.2	7.1
10	38.1	23.3	21.2	36.0	6.7	15.2	10.6	3.9	2.5	8.5	3.2	6.7
11	38.1	23.3	21.2	26.8	6.7	15.2	8.8	3.9	2.5	8.5	3.2	6.7
12	41.0	23.3	21.2	18.0	6.7	15.2	8.1	2.5	3.2	8.5	2.1	7.8
13	47.3	23.3	21.2	18.0	7.8	12.4	8.1	2.5	3.2	10.9	2.1	7.8
14	47.3	21.2	21.2	18.0	7.8	9.9	8.1	2.5	5.3	16.6	2.1	9.9
15	35.4	21.2	21.2	15.9	6.7	6.0	6.7	2.5	5.3	16.6	2.1	10.9
16	30.0	19.8	21.2	19.8	6.7	6.0	6.7	2.5	6.7	12.7	2.1	10.9
17	32.5	19.8	21.2	23.0	7.8	5.0	5.3	2.5	6.7	8.5	3.2	14.5
18	30.0	21.2	21.2	19.8	7.8	5.0	4.2	2.5	6.7	16.6	3.2	14.5
19	21.5	21.2	22.9	15.9	7.8	5.0	4.2	2.5	6.7	14.4	2.1	12.7
20	21.5	21.2	22.9	18.0	7.8	5.0	4.2	3.9	6.7	12.7	4.2	16.6
21	21.5	23.0	23.0	24.7	5.6	5.0	4.2	3.9	5.3	9.9	4.2	32.5
22	19.8	23.0	24.7	23.0	4.9	4.9	4.2	3.9	5.3	6.0	3.2	36.7
23	19.8	23.0	24.7	23.0	4.9	4.9	4.2	3.9	5.3	8.5	2.1	32.5
24	19.8	23.0	23.0	23.0	4.9	3.9	5.0	3.9	5.3	6.0	2.1	30.4
25	19.8	32.8	23.0	19.8	4.9	3.9	3.9	3.9	6.7	6.0	2.1	30.4
26	21.5	41.0	23.0	10.2	4.9	4.9	3.9	2.5	6.7	6.0	2.1	30.4
27	19.8	41.0	23.0	10.2	4.9	4.9	3.9	2.5	8.4	6.0	2.1	34.2
28	21.5	29.6	23.0	8.8	4.9	4.9	3.9	2.4	8.4	6.0	2.1	48.7
29	21.5		24.7	8.8	4.9	4.9	3.9	2.4	8.4	6.0	4.3	45.9
30	21.5		24.7	6.7	487	4.9	2.5	2.4	8.4	6.0	7.1	45.9
31	23.3		24.7		442		2.5	2.4		6.0		38.8

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1932 to 1937
January	2.10	1.57	3	60.0	26	18.7	32.2	1,980	4,894
February	1.90	1.64	26	41.0	16	19.8	24.6	1,370	3,071
March	1.80	1.64	31	33.2	1	19.8	22.7	1,390	2,293
April	1.90	1.38	11	41.0	30	6.7	21.2	1,260	2,990
May	8.30	1.28	30	2,600	29	4.2	36.0	2,210	6,832
June	3.08	1.54	1	184	24	3.2	21.4	1,270	6,453
July	1.90	1.54	8	14.5	31	1.4	6.0	368	3,251
August	1.64	1.54	21	4.9	2	1.4	2.8	174	1,491
September	1.77	1.54	30	9.5	10	1.4	5.0	298	4,941
October	1.97	1.71	18	19.4	27	4.2	9.5	581	8,596
November	2.20	1.61	3	36.7	13	1.4	4.0	273	5,450
December	2.89	1.67	28	106	7	5.7	18.9	1,160	5,319
The Year	8.30	1.28		2,600		1.4	17.0	12,298	55,581

RIO GRANDE AT LAREDO STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car. Cable and car located about 2-1/2 miles above the cities of Laredo, Texas, and Nuevo Laredo, Tamaulipas. Water-stage recorder is attached to north abutment of railroad bridge at Laredo. Zero of gage at the cable is elevation 353.13 feet. The water-stage recorder was first located near the cable using the above gage. The recorder was moved to its present location in October, 1925, and zero of gage was elevation 352.65 feet. On August 25, 1930, zero of gage at recorder was changed to elevation 351.50 feet. All gage elevations are on United States Coast and Geodetic Survey sea level datum.

RECORDS: Based on 158 meter measurements. Computations by shifting channel methods. 1937 records good. Records available: May, 1900, to March, 1914; from October, 1922, to December, 1937.

REMARKS: The river flow at this station is modified by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated the drainage area above this station is 129,362 square miles, of which 87,963 are in the United States and 41,399 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest previous recorded flow was on September 3, 1932, when the peak gage reading was 52.20 feet, the flow being 402,000 second feet. On September 27 and 28, 1932 a minimum flow of 870 second feet was reached. Numerous records of extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,900	2,670	2,610	2,070	1,510	11,900	2,490	*2,000	3,100	11,500	2,300	1,940
2	2,800	2,580	2,720	2,000	1,430	11,300	2,100	*1,850	2,620	10,900	2,300	2,120
3	2,670	2,470	2,720	2,070	1,310	7,520	2,100	*1,730	2,260	8,330	2,520	2,000
4	2,670	2,260	2,610	2,070	1,260	6,570	2,490	*1,700	3,330	6,850	3,040	2,120
5	2,660	2,370	2,480	1,920	1,260	6,430	2,970	*1,550	3,710	6,000	2,700	3,320
6	2,580	2,260	2,480	1,840	1,260	18,400	2,490	*1,490	2,120	5,330	2,520	2,450
7	2,800	2,170	2,620	1,710	1,920	9,920	2,100	*1,450	2,170	4,940	2,610	2,150
8	2,670	2,260	2,830	1,570	1,510	8,620	2,480	*1,480	1,830	4,380	3,130	2,120
9	2,460	2,260	2,830	1,510	1,620	6,220	2,480	*1,400	1,900	3,780	3,320	2,150
10	2,370	2,260	2,720	1,570	1,570	4,590	4,800	*1,350	1,850	3,600	2,780	2,220
11	2,370	2,170	2,610	1,840	1,570	4,240	4,590	*1,320	1,700	3,460	2,520	2,120
12	2,460	2,260	2,300	1,620	1,620	3,810	2,480	*1,300	2,760	3,460	2,370	2,120
13	2,470	2,170	2,190	1,620	1,510	3,280	*2,570	*1,270	1,550	3,030	2,170	2,300
14	2,470	2,260	2,190	1,570	*1,900	3,110	*1,790	*1,200	1,550	2,930	2,080	2,440
15	2,470	2,470	2,190	1,510	*1,950	3,110	*1,540	*1,200	1,940	2,820	2,000	2,530
16	2,470	2,370	2,100	1,510	*1,870	3,180	1,250	1,200	10,300	*7,500	2,120	2,700
17	2,470	2,470	2,190	1,510	*2,000	2,900	1,280	1,280	7,270	*8,500	2,120	2,780
18	2,370	2,470	2,190	1,510	2,300	2,610	1,710	1,430	4,840	7,560	2,120	2,860
19	2,370	2,580	2,100	1,510	1,980	2,480	1,730	1,350	3,670	6,000	2,000	2,860
20	2,470	2,670	2,100	1,570	1,650	2,480	2,490	1,350	3,180	4,380	2,000	2,370
21	2,580	2,470	2,320	1,430	1,520	2,610	2,160	953	3,180	*4,400	2,000	2,610
22	2,470	2,580	2,270	1,380	1,410	3,110	2,000	1,010	3,220	*4,300	2,150	2,800
23	2,370	2,660	2,270	1,430	1,410	3,280	2,160	1,060	3,470	*4,000	2,150	2,800
24	2,170	2,660	2,170	1,510	1,480	3,710	2,050	2,120	3,320	*3,500	2,150	2,720
25	2,260	2,670	2,120	2,370	1,440	3,460	2,000	2,260	2,930	*3,200	2,150	2,370
26	2,470	2,580	2,120	2,370	1,550	3,220	2,120	4,700	2,600	*3,100	2,120	2,430
27	2,470	2,470	2,070	2,170	1,550	3,020	2,220	4,520	4,900	*2,900	2,120	2,800
28	2,470	2,260	2,070	2,000	1,590	3,020	2,420	4,910	7,100	*2,700	2,120	3,060
29	2,470		2,120	1,770	1,550	3,020	2,630	5,120	9,750	*2,600	2,120	3,600
30	2,580		2,120	1,570	3,320	3,020	2,560	4,380	10,400	*2,600	1,940	4,940
31	2,580		2,000		9,250		2,120	4,100		2,520		5,120

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	5.38	5.02	1	3,110	25	2,010	2,510	154,000	189,949
February	5.28	5.02	1	2,800	14	2,010	2,420	134,000	154,859
March	5.25	4.66	8	3,020	31	1,840	2,340	144,000	155,919
April	5.22	4.40	25	2,970	15	1,310	1,740	103,000	156,674
May	9.12	4.33	30	15,800	4	1,200	1,910	117,000	286,568
June	10.20	5.02	6	21,000	20	2,290	5,140	306,000	322,336
July	6.92	4.43	10	7,880	16	1,190	2,330	144,000	222,869
August	6.40	4.30	26	6,070	21	855	2,070	*127,000	274,805
September	8.40	4.86	16	12,500	14	1,360	3,820	227,000	693,276
October	7.38	5.09	16	8,900	30	2,450	4,870	*300,000	487,341
November	5.54	4.82	8	3,740	19	1,880	2,320	138,000	220,626
December	6.86	4.82	29	7,270	3	1,880	2,670	164,000	195,222
The Year	10.20	4.30		21,000		855	2,840	2,058,000	3,360,443

* Partly Estimated

RIO SALADO STATION AT CD. GUERRERO, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located at the place called "El Cable" about 6.2 miles above the confluence of the Rio Salado with the Rio Grande and 2 miles southward of Ciudad Guerrero, Tamaulipas. Zero of gage is 265.74 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based on 176 meter measurements during the year. Computations by shifting channel methods except at stages below 4.27 feet where channel conditions are stable, being in solid rock. 1937 records good. Records available: 1901 to 1912; 1923 to 1937.

REMARKS: The flow of the Rio Salado is greatly modified by the Don Martin reservoir, which forms a part of National Irrigation System No. 4, Coahuila-Nuevo Leon, and by irrigation. This station was entirely rebuilt by the Mexican Section of this Commission in December, 1932, when an automatic water-stage recorder was installed. The drainage area above this station is 21,830 square miles, entirely in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow at this station was on September 7, 1933, when an extreme gage height of 18.86 feet was reached with a corresponding discharge of 43,800 second feet. The stream has not been dry since irrigation commenced in System No. 4 in 1931. Numerous extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	146	124	246	93.6	134	1,050	175	56.9	51.9	146	49.4	67.8
2	162	124	283	93.6	146	1,660	140	54.4	51.9	98.2	47.0	62.5
3	198	118	267	93.6	146	3,920	129	51.9	49.4	76.3	202	59.7
4	169	118	259	93.6	187	1,190	129	51.9	49.4	65.0	237	59.7
5	146	129	252	89.7	192	1,070	129	49.4	51.9	59.7	146	65.0
6	140	180	231	85.5	225	1,640	129	49.4	56.8	54.4	205	82.6
7	140	175	219	82.6	1,370	2,610	169	51.9	59.7	54.4	276	231
8	140	140	212	82.6	1,490	1,460	219	49.4	56.8	56.8	192	162
9	134	134	204	76.3	434	356	225	47.0	54.4	56.8	146	152
10	129	146	212	76.3	374	340	175	47.0	51.9	208	108	187
11	129	140	192	79.5	231	307	157	47.0	51.9	1,040	82.6	129
12	129	129	192	89.7	169	307	134	49.4	54.4	402	70.3	93.6
13	129	129	187	82.6	1,350	175	113	47.0	54.4	402	65.0	82.6
14	129	134	169	82.6	2,350	140	103	44.8	54.4	231	59.7	79.4
15	129	146	162	93.6	1,450	123	98.2	44.8	409	129	56.9	76.3
16	134	162	152	113	636	113	108	4,520	341	98.2	54.4	73.4
17	134	187	146	134	357	103	113	9,680	212	85.5	54.4	70.3
18	134	204	152	157	229	98.2	103	515	146	76.3	54.4	70.3
19	134	180	140	129	162	108	89.7	218	108	73.4	51.9	70.3
20	157	187	239	103	129	108	82.6	129	89.7	70.3	49.4	73.4
21	140	198	332	98.2	108	113	76.3	93.6	79.5	73.4	49.4	76.3
22	130	187	152	118	93.6	118	70.3	76.3	73.5	70.3	49.4	82.6
23	124	187	124	118	89.7	123	67.8	67.8	70.3	65.0	51.6	79.4
24	118	219	113	134	82.6	123	62.5	62.5	65.0	59.7	51.6	73.4
25	113	219	108	152	82.6	123	59.7	56.9	59.7	56.8	54.4	76.3
26	118	204	103	108	85.5	129	59.7	54.4	54.4	56.8	59.7	79.5
27	140	212	113	108	89.7	129	56.9	82.6	51.9	56.8	59.7	85.5
28	134	225	124	118	124	140	56.9	197	56.8	54.4	56.9	93.6
29	129		108	119	108	134	56.9	186	275	51.9	54.4	290
30	124		108	124	113	169	56.9	76.3	225	51.9	62.5	98.2
31	118		98.2		576		59.7	56.9		49.4		76.3

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	2.62	2.07	3	204	25	108	136	8,390	24,666
February	2.76	2.07	28	231	20	108	166	9,200	17,452
March	4.30	1.97	20	699	31	93.6	180	11,100	10,877
April	2.82	1.77	24	245	9	73.5	104	6,210	16,444
May	7.61	1.87	7	4,840	24	82.6	431	26,400	51,146
June	8.04	2.00	3	5,510	18	98.2	607	36,000	44,729
July	2.99	1.57	9	283	30	56.9	110	6,760	24,703
August	12.57	1.38	17	16,500	14	42.4	544	33,400	15,745
September	3.90	1.44	20	551	4	47.0	102	6,080	117,073
October	5.68	1.48	11	1,850	31	49.4	133	8,190	99,514
November	3.48	1.44	3	413	2	47.0	91.8	5,470	38,138
December	3.84	1.61	29	530	3	59.7	98.5	6,070	27,557
The Year	12.57	1.38		16,500		42.4	226	163,270	488,044

RIO GRANDE AT ZAPATA STATION

DESCRIPTION: Water-stage recorder and cable with stand up cable car and winch located about 3 miles by river below the town of Zapata, Texas and 7-1/2 miles northeast of Guerrero, Tamaulipas, and 1.3 mile below the confluence of the Rio Salado with the Rio Grande. Zero of the gage is at mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 52 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: January, 1932, to December, 1937.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated the drainage area above this station is 153,161 square miles; 89,060 being in the United States and 64,101 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest recorded flow was on September 4, 1932, when the extreme gage height was 262.07 feet and the extreme flow was 261,160 second feet. The lowest flow recorded was on June 23, 1932, when the extreme gage height was 219.18 feet and the extreme flow 992 second feet.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*3,150	2,840	2,660	2,080	1,690	9,560	3,170	2,240	3,790	11,600	2,460	2,010
2	*3,150	2,780	2,750	2,100	1,690	11,400	2,730	2,000	3,020	11,500	2,330	2,050
3	*3,100	2,760	2,880	2,000	1,540	15,000	2,210	1,860	2,670	10,400	2,440	2,090
4	*3,050	2,660	2,780	1,900	1,500	6,620	2,080	1,720	2,530	8,250	2,720	2,060
5	*3,050	2,730	2,910	1,980	*1,450	4,790	2,230	1,650	3,620	6,880	3,110	3,980
6	*3,000	2,610	2,870	1,920	*1,540	15,800	2,440	1,540	3,040	6,020	2,990	3,240
7	*2,900	2,630	2,870	1,840	2,960	16,500	2,400	1,440	2,290	5,410	2,900	2,620
8	*2,950	2,580	2,900	1,740	4,080	9,990	2,250	1,420	1,930	4,970	2,840	2,270
9	*2,900	2,600	3,030	1,650	2,680	7,810	2,450	1,430	1,860	*4,520	2,850	2,170
10	*2,900	2,620	3,030	1,610	1,920	6,100	2,310	1,370	1,780	*4,060	3,260	2,230
11	*2,850	2,620	2,930	1,610	1,650	5,010	4,440	1,310	1,810	*3,700	2,810	2,260
12	*2,900	2,680	2,830	1,940	1,480	4,740	3,320	1,290	1,820	4,500	2,600	2,180
13	*2,900	2,600	2,610	1,800	2,480	4,000	2,040	1,290	3,020	3,850	2,420	2,150
14	2,980	2,600	2,460	1,760	4,210	3,470	1,720	1,220	2,010	3,280	2,230	2,500
15	2,980	2,600	2,450	1,720	3,190	3,420	1,620	1,180	2,310	3,100	2,130	2,600
16	2,950	2,650	2,420	1,630	2,270	3,280	1,540	11,200	4,750	2,980	2,090	2,700
17	2,980	2,710	2,390	1,650	2,150	3,400	1,400	12,600	10,900	7,410	2,160	2,950
18	2,940	2,690	2,350	1,810	1,980	2,990	1,450	2,440	7,060	9,410	2,160	2,900
19	2,840	2,760	2,470	1,690	2,180	2,880	1,720	*1,420	5,210	7,090	2,220	2,550
20	2,930	2,760	2,450	1,640	2,000	2,820	1,790	*1,120	4,090	5,830	2,240	2,600
21	2,930	2,790	2,500	1,680	1,860	2,820	2,640	*1,030	3,600	4,500	2,100	2,750
22	2,950	2,630	2,630	1,620	1,690	2,890	2,320	*958	3,710	4,270	2,170	2,950
23	2,850	2,620	2,380	1,550	1,490	3,260	2,060	*906	3,800	4,320	2,210	2,980
24	2,840	2,780	2,340	1,740	1,420	3,460	2,240	*906	3,800	4,040	2,190	2,900
25	2,640	2,780	2,180	1,840	1,440	3,830	2,140	2,130	3,430	3,530	2,180	2,840
26	2,690	2,750	2,160	2,340	1,370	3,580	2,070	*2,500	*3,200	3,220	2,110	2,670
27	2,820	2,680	2,150	2,390	1,460	3,310	2,160	*4,610	*3,200	3,020	2,100	2,690
28	2,860	2,750	2,230	2,180	1,680	3,180	2,290	*4,150	5,940	2,880	2,070	2,910
29	2,940		2,220	2,060	1,780	3,190	2,500	*4,780	7,830	2,690	2,040	3,590
30	2,910		2,170	1,840	1,960	3,300	2,760	*4,480	11,500	2,580	2,020	4,570
31	2,860		2,210		6,840		2,620	*4,100		2,520		6,280

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1932 to 1937
January	220.90	*220.68	2	3,410	26	*2,600	2,930	180,000	229,212
February	220.81	*220.64	3	3,070	23	*2,500	2,690	149,000	184,530
March	220.85	*220.45	9	3,170	27	*2,090	2,560	157,000	180,012
April	220.79	220.16	26	2,980	24	1,520	1,840	110,000	165,028
May	223.70	220.07	31	13,500	26	1,320	2,180	134,000	287,158
June	225.80	220.73	6	24,200	20	2,770	5,750	342,000	445,077
July	221.83	220.09	11	6,050	17	1,340	2,290	141,000	269,117
August	224.50	219.82	17	17,800	24	889	2,650	163,000	210,730
September	223.58	220.23	17	13,100	10	1,700	3,980	237,000	1,158,695
October	223.32	220.64	1	11,900	31	2,420	5,240	322,000	749,290
November	221.10	220.47	10	3,660	30	1,970	2,400	143,000	284,257
December	222.11	220.47	31	6,840	1	1,970	2,810	173,000	251,860
The Year	225.80	219.82		24,200		889	3,110	2,251,000	4,414,966

* Partly Estimated

RIO ALAMO STATION AT CD. MIER, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located about 3 miles from the confluence of the Rio Alamo with the Rio Grande and 2/3 of a mile west of Ciudad Mier, Tamaulipas, Mexico, at a point called "Paso del Cantaro." Zero of gage is 187.04 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 51 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: July, 1923, to December 31, 1937.

REMARKS: The flow of this spring-fed stream is somewhat modified by irrigation diversions above the station. The drainage area above this station is 1,840 square miles, all in Mexico.

PREVIOUS RECORDED FLOWS: The greatest recorded flow occurred on September 7, 1933, with an extreme gage height of 26.9 feet and a corresponding flow of 76,600 second feet. The river is often dry. Numerous records of extreme flow may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	20.5	20.5	2.1	10.9	2.1	.4	36.4	0	2.8	8.5	2.8	7.1
2	20.5	20.5	2.1	10.9	3.9	7.1	8.5	0	1.4	8.5	3.9	7.1
3	20.5	20.5	2.8	9.5	7.1	8.5	2.8	0	.4	8.5	300	8.5
4	20.5	20.5	2.8	9.5	4.9	3.9	1.4	0	0	8.5	95.7	8.5
5	20.5	20.5	2.8	8.5	3.9	1.4	162	0	0	7.1	29.0	10.9
6	20.4	18.4	4.9	8.5	3.9	.7	6.0	0	2.1	2.8	13.1	10.9
7	20.4	15.6	4.9	7.1	347	35.0	13.0	0	6.0	1.4	25.8	13.1
8	20.4	13.1	4.9	7.1	95.4	49.4	6.0	0	1.4	.4	29.0	10.9
9	20.4	13.1	4.9	8.5	32.5	32.5	2.1	0	.4	.4	18.0	11.0
10	18.4	10.9	4.9	6.0	15.2	18.0	840	0	0	138	10.9	10.9
11	20.5	10.9	5.0	6.0	9.5	9.5	105	0	0	2,120	8.5	9.5
12	18.4	10.9	7.1	4.9	7.1	6.0	15.2	0	0	1,050	7.1	9.5
13	20.5	9.9	7.1	6.0	385	2.8	6.0	0	0	344	7.1	9.5
14	20.5	6.0	6.0	7.1	505	1.4	2.8	0	0	90.7	7.1	9.5
15	20.4	4.9	3.9	5.0	59.3	1.4	1.4	0	0	40.4	6.0	8.5
16	18.4	3.9	3.9	5.0	54.0	.7	2.8	0	0	25.8	5.0	9.5
17	15.5	3.9	3.9	5.0	29.0	.3	154	1,720	0	20.1	3.9	9.5
18	13.1	3.9	3.9	4.9	18.0	0	94.3	108	.7	15.2	3.9	9.5
19	10.9	3.9	2.8	3.9	13.1	0	9.5	36.5	1.4	11.0	3.9	8.5
20	13.1	3.9	480	2.8	9.5	0	2.8	20.1	.7	8.5	4.9	8.5
21	13.1	2.8	349	2.1	8.5	0	1.4	11.0	.4	7.1	6.0	10.9
22	15.5	2.8	140	2.1	8.5	0	.7	7.1	.4	6.0	7.1	10.9
23	15.5	2.8	36.4	2.1	7.1	0	.3	3.9	2.8	5.0	7.1	10.9
24	13.1	2.8	18.0	2.1	7.1	0	0	2.1	2.8	5.0	7.1	10.9
25	13.1	2.8	13.1	73.1	6.0	0	0	1.4	53.0	3.9	8.5	10.9
26	13.1	2.8	10.9	20.1	3.9	0	0	.7	1,240	3.9	8.5	10.9
27	13.1	2.1	9.5	13.1	2.1	0	0	107	534	50.5	8.5	9.5
28	18.4	2.1	9.5	7.1	1.4	0	0	230	40.3	8.8	7.1	9.5
29	20.5		9.5	3.9	.7	0	0	15.2	18.0	3.9	7.1	159
30	20.5		10.9	2.8	.7	44.5	0	13.1	11.0	3.9	7.1	44.5
31	20.5		10.9		.3		0	7.1		2.8		23.0

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January	1.02	.85	1	23.0	19	10.9	17.7	1,090	7,336
February	.98	.59	5	20.5	27	2.1	9.2	509	5,504
March	5.54	.59	20	2,590	1	2.1	38.1	2,340	4,041
April	1.84	.56	25	151	23	1.4	8.8	527	7,598
May	4.04	.49	13	1,140	31	.4	53.3	3,280	19,979
June	2.20	.07	7	232	29	0	7.4	443	16,830
July	4.23	.30	10	1,310	31	0	47.7	2,920	11,020
August	6.43	.00	17	3,460	7	0	73.8	4,530	5,752
September	4.66	.36	26	1,730	15	0	63.9	3,810	32,099
October	5.87	.49	11	2,900	9	.4	129	7,960	14,566
November	3.61	.59	3	826	2	2.1	21.9	1,310	5,846
December	2.59	.75	29	344	2	7.1	16.2	995	5,779
The Year	6.43	.00		3,460		0	41.0	29,714	136,350

RIO GRANDE AT ROMA STATION

DESCRIPTION: Water-stage recorder at international bridge between Roma, Texas and San Pedro, Tamaulipas. Zero of gage is 145.90 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 59 meter measurements during the year from bridge. Computations by shifting channel methods. 1937 records good. Records available: August, 1900, to March, 1914; November, 1922, to December, 1937.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated the drainage area above this station is 156,461 square miles; 90,092 being in the United States and 66,369 in Mexico. After March, 1929, the station was operated by the United States, and previously by Mexico. Datum of present gage is 1.1 foot lower than that used prior to 1922. Backwater from the Rio San Juan sometimes reaches this station. See Water Bulletin No. 3, page 50.

PREVIOUS EXTREME FLOWS: The greatest previous recorded flow was on September 5, 1932, when the extreme gage height was 35.4 feet and the extreme flow 203,000 second feet. The lowest flow ever recorded was on May 29, 1925, when the extreme flow was 975 second feet. Records of other extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,100	2,790	2,580	2,090	1,820	9,280	3,240	2,390	3,980	11,200	2,450	2,040
2	3,090	2,740	2,570	1,990	2,290	12,700	2,990	2,100	3,340	11,700	2,370	2,040
3	3,080	2,720	2,680	1,950	1,630	14,000	2,580	1,890	2,820	10,900	2,430	2,060
4	3,050	2,800	2,740	1,880	1,530	10,600	2,240	1,780	2,540	8,540	2,650	2,060
5	2,960	2,680	2,710	1,830	1,500	6,830	2,330	1,690	2,400	7,020	2,600	2,400
6	3,000	2,590	2,770	1,840	1,560	8,610	2,530	1,620	3,940	6,130	3,040	3,820
7	2,940	2,710	2,730	1,770	2,780	19,200	3,140	1,510	2,810	5,650	2,980	2,890
8	2,850	2,680	2,750	1,700	3,980	13,100	2,500	1,450	2,160	5,130	2,860	2,500
9	2,870	2,570	2,820	*1,660	3,070	10,500	2,440	1,410	1,930	4,750	2,670	2,220
10	2,840	2,640	2,880	*1,560	1,950	7,680	3,110	1,380	1,820	4,450	2,730	2,260
11	2,840	2,660	2,830	*1,540	1,730	6,010	2,510	1,310	1,730	10,000	2,900	2,270
12	2,800	2,640	2,760	*1,590	1,480	5,050	4,920	1,260	1,750	7,330	2,620	2,260
13	2,850	2,650	2,630	*1,800	3,200	4,530	2,620	1,190	1,770	4,620	2,450	2,190
14	2,850	2,690	2,500	*1,730	5,470	3,620	1,850	1,170	2,580	3,740	2,280	2,150
15	2,910	2,600	2,420	*1,700	3,960	3,110	1,650	1,080	1,810	3,220	2,110	2,240
16	2,900	2,620	2,410	*1,680	2,820	3,190	1,580	5,220	2,120	*3,130	2,060	2,380
17	2,870	2,630	2,400	*1,610	2,560	3,040	1,580	13,600	2,920	4,370	1,990	2,460
18	2,900	2,650	2,400	*1,620	2,030	3,140	1,600	6,570	7,630	8,310	2,020	2,500
19	2,820	2,740	2,430	*1,660	2,000	2,820	1,460	2,770	5,540	8,250	2,000	2,550
20	2,760	2,690	3,040	*1,610	2,040	2,700	1,650	2,000	4,240	6,280	2,060	2,650
21	2,780	2,640	2,820	*1,590	1,900	2,650	1,810	1,680	3,520	5,060	2,040	2,690
22	2,780	2,610	2,740	*1,590	1,780	2,730	2,340	1,330	*3,360	4,320	1,970	2,920
23	2,740	2,520	2,520	*1,540	1,640	2,850	2,130	1,070	3,360	4,160	2,020	2,980
24	2,690	2,570	2,310	*1,520	1,510	3,210	2,040	973	3,550	4,140	2,090	2,970
25	2,650	2,670	2,210	*1,530	1,450	3,600	2,190	962	3,560	3,660	2,120	2,820
26	2,560	2,650	2,100	*1,610	1,450	3,720	2,120	2,040	7,690	3,230	2,110	2,700
27	2,670	2,580	2,060	*2,200	1,410	3,420	2,080	2,610	4,830	3,080	2,060	2,550
28	2,750	2,560	2,080	*2,100	1,480	3,180	2,140	4,730	3,330	3,040	2,070	2,620
29	2,820		2,110	*1,960	1,600	3,190	2,220	4,130	7,140	2,790	2,040	3,300
30	2,820		2,070	*1,820	1,650	3,500	2,450	4,800	9,200	2,630	2,030	3,920
31	2,780		2,090		1,770		2,590	4,010		2,460		5,370

Month	Extreme Gage Height — Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	1.70	1.21	1	3,150	27	2,520	2,850	175,000	234,949
February	1.44	1.08	4	2,850	24	2,480	2,650	147,000	191,881
March	2.60	.61	20	4,500	27	2,020	2,520	155,000	183,691
April	1.07	.06	27	2,420	24	1,500	*1,740	*104,000	194,074
May	4.49	-.01	13	7,840	28	1,390	2,160	133,000	359,142
June	8.75	1.41	7	21,200	22	2,630	6,060	361,000	424,067
July	3.57	.28	12	5,870	19	1,430	2,340	144,000	290,524
August	7.80	-.32	17	18,300	25	914	2,640	162,000	279,629
September	6.06	.34	30	11,700	13	1,720	3,650	217,000	863,046
October	7.15	1.12	11	15,300	31	2,420	5,590	344,000	603,189
November	1.82	.67	8	3,300	30	2,020	2,330	138,000	269,334
December	3.78	.66	31	6,550	1	2,010	2,670	164,000	237,594
The Year	8.75	-.32		21,200		914	3,100	2,244,000	4,131,120

* Partly Estimated

RIO SAN JUAN STATION AT SANTA ROSALIA, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located about 27-1/2 miles above the confluence with the Rio Grande and 15 miles south of Ciudad Camargo, Tamaulipas, Mexico, at a ranch called Santa Rosalia, 3 miles west of Ochoa Railway Station. Zero of gage is 205.15 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 156 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: May 1, 1900, to 1913; 1923 to 1937.

REMARKS: Daily gage readings began May 1, 1900, and meter measurements October 3, 1900, at La Quemada Ranch (now Ochoa settlement). The station was moved 2-1/2 miles upstream to its present location July 14, 1902. For more detailed history of gages, see previous Water Bulletins.

When the river at this station rises above a gage height of 36.1 feet, water overflows the left river bank above the station and returns to the river below the station. At a gage height of 42.6 feet, water submerges the right river bank at the station but follows the main river. The river flow is modified at this station by irrigation diversions, and other uses along the San Juan River basin. The drainage area above this station is 13,000 square miles, entirely in Mexico.

PREVIOUS EXTREME FLOWS: On September 29, 1932, there was recorded an extreme gage height of 41.01 feet with an estimated discharge of 187,000 second feet. On August 30, 1909, there occurred a flood which reached a height estimated at 49.21 feet on the present scale, according to records of the residents of the region. Slope-area computations supported by measurements during recent floods, show the 1909 flood peak to have been 353,000 second feet, without considering the water which overflowed the river channel to a width of nearly 2 miles. The river runs dry at times. In previous Water Bulletins may be seen numerous records of extreme flows.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	826	540	342	315	57.2	49.8	516	145	145	692	175	268
2	805	526	342	315	57.2	49.8	175	130	118	576	175	268
3	788	512	343	315	53.3	36.7	113	123	90.4	495	168	282
4	788	526	343	304	53.3	31.8	79.1	118	72.7	417	168	438
5	770	551	353	282	87.2	26.1	293	113	57.2	374	168	869
6	749	562	364	247	140	26.1	3,230	113	84.0	343	353	989
7	749	541	353	227	258	36.7	1,840	124	666	293	855	1,180
8	735	541	327	227	140	2,290	1,110	113	315	258	1,700	1,010
9	699	526	343	219	168	986	2,510	97.4	218	228	968	819
10	632	480	364	201	161	410	6,530	84.0	145	1,310	720	735
11	618	459	410	192	237	227	3,230	72.7	113	7,200	593	678
12	618	459	586	175	364	154	1,820	62.1	79.1	1,870	523	639
13	618	481	568	168	427	91.8	1,130	57.2	62.1	735	438	611
14	632	526	494	161	315	73.1	897	53.0	48.7	410	410	576
15	618	551	448	153	237	60.7	805	62.2	41.0	427	399	540
16	597	540	427	145	540	53.3	720	53.0	41.0	1,040	399	523
17	586	512	410	140	438	36.7	1,370	62.2	44.5	819	374	523
18	579	480	399	129	293	28.3	2,940	62.2	25.4	653	364	522
19	562	470	417	110	201	28.2	1,530	44.5	21.2	611	343	494
20	551	459	427	101	145	25.8	735	53.0	21.2	586	314	459
21	540	438	469	91.8	140	23.0	593	84.0	21.2	523	304	438
22	526	410	470	87.2	101	20.5	495	79.1	48.7	417	293	448
23	480	399	399	82.3	87.2	18.4	417	67.1	62.1	374	293	494
24	459	399	364	77.7	82.3	18.4	399	57.2	62.1	314	304	523
25	459	388	364	73.1	73.1	18.4	353	48.7	62.1	293	304	459
26	480	388	364	68.9	68.9	16.6	304	45.2	3,530	268	293	438
27	480	371	343	64.6	60.7	16.6	293	45.2	3,670	268	293	438
28	480	353	315	60.8	58.6	14.5	328	67.1	2,310	247	293	417
29	480		304	57.2	53.3	14.5	293	320	1,250	237	304	417
30	526		315	57.2	49.8	248	201	399	883	219	268	523
31	551		315		49.8		168	201		201		678

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	4.59	3.71	1	848	25	459	611	37,600	36,245
February	3.97	3.35	6	562	28	353	477	26,600	23,929
March	4.23	3.18	12	646	24	293	388	24,000	17,294
April	3.25	2.20	1	315	30	57.2	162	9,620	19,019
May	4.07	2.13	15	586	31	49.8	168	10,300	52,961
June	8.96	1.80	8	3,570	29	14.5	171	10,200	117,196
July	13.45	2.13	10	7,840	5	53.0	1,140	70,200	92,513
August	4.30	2.03	29	735	27	41.0	102	6,260	70,359
September	10.27	1.90	27	4,630	21	15.9	477	28,400	256,332
October	14.93	2.85	11	9,610	31	192	731	45,000	116,876
November	7.84	2.72	7	2,700	5	159	420	24,900	61,320
December	5.41	3.12	7	1,250	1	268	572	35,100	43,817
The Year	14.93	1.80		9,610		14.5	453	328,180	957,861

RIO GRANDE AT RIO GRANDE CITY STATION

DESCRIPTION: Water-stage recorder and cable with stand up cable car and winch, located about 4 miles by river below Rio Grande City, Texas, 3.7 miles northeast of Camargo, Tamaulipas, and 7.3 miles below the confluence of the Rio San Juan with the Rio Grande. Zero of gage is at mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 59 meter measurements during the year. Computations by shifting channel methods. 1937 records good. Records available: January 1, 1932, to December 31, 1937.

REMARKS: When the water at this station rises above a gage height of about 151 feet, water overflows the left river bank beyond the station cable, but such water is measured.

When floods in the Rio San Juan exceed a gage height of about 38 feet or a flow of about 160,000 second feet at the Santa Rosalia station, water begins to overflow the right bank of that river at several places from El Azucar (20 miles below Santa Rosalia station) downstream. This overflow water cuts across country and reaches the Rio Grande about 9 river miles below Rio Grande City gaging station and is therefore not measured there. In the 1932 flood 411,000 acre feet of water is estimated to have thus bypassed the Rio Grande City station. The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. With all closed basins eliminated, the drainage area above this station is 170,655 square miles; 90,770 being in the United States and 79,885 in Mexico.

PREVIOUS EXTREME FLOWS: The highest reported gage height was in 1909, when the extreme gage height was 159.2 feet, present gage datum, as reported by residents and confirmed by extreme gage height at Rio Grande City Weather Bureau gage and other points in the vicinity, as found in Joint Report of International Boundary Commission 1910-11.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,070	3,400	2,960	2,480	1,930	5,950	4,280	2,670	4,260	11,900	*2,480	2,300
2	4,020	3,410	2,950	2,440	2,600	12,000	3,870	2,400	3,980	12,600	*2,440	2,300
3	4,000	3,380	2,990	2,360	2,100	13,800	3,210	*2,200	3,320	12,600	*2,470	2,300
4	3,960	3,400	3,090	2,320	1,660	13,200	2,710	*2,140	2,910	10,600	2,950	2,340
5	3,920	*3,460	3,050	2,230	*1,580	8,080	2,440	*2,020	2,710	8,220	3,120	2,560
6	3,890	*3,450	3,110	2,240	*1,533	6,360	3,380	*1,940	3,280	6,920	*3,400	4,290
7	3,880	*3,300	3,140	2,210	3,160	17,800	6,420	*1,790	3,810	6,150	*3,370	4,540
8	3,800	*3,460	3,080	2,120	3,440	16,100	4,340	*1,650	3,090	5,570	*4,530	3,950
9	3,730	*3,500	3,120	2,050	4,350	12,900	3,800	*1,530	2,450	5,130	*4,840	3,330
10	3,680	3,270	3,170	1,970	2,730	9,460	7,130	1,510	2,250	4,560	4,400	3,100
11	3,660	3,270	3,210	1,900	2,040	7,010	8,050	1,460	2,080	13,000	4,120	3,090
12	3,580	3,250	3,210	1,880	1,850	5,520	6,480	1,390	1,990	15,500	3,530	3,000
13	3,580	3,180	3,290	2,030	2,210	4,860	5,430	1,360	1,950	6,570	3,200	3,000
14	3,630	3,220	3,110	2,030	7,300	4,090	3,210	1,360	2,340	4,500	2,980	2,950
15	3,600	3,200	2,960	1,940	5,320	3,510	2,470	1,310	2,240	3,570	2,740	2,900
16	3,630	3,130	2,890	1,880	4,120	3,260	2,310	1,780	1,950	3,460	2,570	2,950
17	3,600	3,140	2,880	1,790	3,290	3,270	2,460	9,500	4,390	3,860	2,470	3,000
18	3,580	3,070	2,840	1,750	2,690	3,290	3,910	9,700	8,600	7,100	*2,490	3,050
19	3,560	3,090	2,860	*1,800	2,180	3,110	4,190	3,640	6,780	9,270	*2,430	3,100
20	3,480	3,170	3,090	1,730	2,250	2,980	2,550	2,110	5,120	7,160	*2,400	3,100
21	3,420	3,090	3,530	1,710	2,060	2,930	2,360	1,570	3,970	5,690	*2,550	3,060
22	3,410	3,070	3,380	1,690	1,970	2,930	2,660	1,280	3,450	4,490	*2,500	3,140
23	3,330	2,990	3,210	1,650	1,820	3,030	2,680	1,190	3,370	4,260	*2,400	3,340
24	3,310	2,970	2,900	1,610	1,680	3,270	2,440	1,110	3,440	4,400	*2,420	3,410
25	3,280	3,040	2,730	1,660	1,570	3,520	2,420	1,040	3,680	4,290	*2,440	3,370
26	3,220	3,070	2,620	1,750	1,520	3,950	2,440	1,360	9,180	3,840	*2,440	3,250
27	3,200	3,000	2,520	1,880	1,520	3,780	2,320	2,200	11,200	3,570	2,430	3,070
28	3,300	2,950	2,480	2,360	1,480	3,480	2,330	4,260	7,130	3,500	2,360	3,010
29	3,370		2,480	2,130	1,600	3,340	2,450	4,630	8,060	3,170	2,360	3,200
30	3,410		2,480	2,020	1,670	3,730	2,530	4,990	9,560	2,930	2,330	4,100
31	3,380		2,440		1,670		2,710	5,140		2,560		5,030

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low			Total	Normal** 1924-1937
	High	Low	Dates		Dates				
January	128.46	127.64	1	4,080	27	3,190	3,600	221,000	277,219
February	127.91	127.33	9	*3,600	28	2,910	3,210	178,000	221,999
March	128.15	126.86	21	3,860	30	2,430	2,960	182,000	206,341
April	126.97	126.00	1	2,510	24	1,600	1,990	118,000	214,909
May	130.32	125.84	14	7,900	28	1,460	2,480	153,000	419,934
June	134.29	127.27	7	20,100	21	2,890	6,350	378,000	544,108
July	131.55	126.89	11	10,400	27	2,270	3,550	218,000	393,535
August	132.77	125.75	17	14,800	25	1,020	2,650	163,000	344,505
September	132.30	126.25	27	13,700	16	1,880	4,400	262,000	1,068,163
October	135.25	126.90	12	23,000	31	2,460	6,480	399,000	795,656
November	128.60	126.78	9	4,970	30	2,310	2,910	173,000	339,251
December	129.28	126.68	31	5,950	1	2,280	3,200	197,000	286,932
The Year	135.25	125.75		23,000		1,020	3,650	2,642,000	5,112,552

* Partly Estimated

** For the years 1924 to 1931 inclusive, the synthetic record for this station was used as published in Water Bulletin No. 5 and recapitulated in Water Bulletin No. 6.

RIO GRANDE AT MERCEDES BRIDGE STATION

DESCRIPTION: Staff-gage located at Mercedes pumping plant, about 500 feet upstream from the international bridge between Mercedes, Texas and Rio Rico, Tamaulipas. Meter measurements made from the bridge. Zero of gage is 50.53 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon daily gage readings and 11 current meter measurements during the period, as well as the previous rating curve. 1937 records considered fair. Records available: Records of discharge are available for September and October, 1932; April 28 to October 3, 1935; July 1 to 31, and September 1 to October 3, 1936, and October 24 to December 31, 1937. Unpublished records of daily river stage are available for each year from 1910 to 1937, except for 1913.

REMARKS: The river flow at this station is greatly modified by many irrigation diversions and by large reservoirs in the United States and Mexico. Immediately above this station, particularly in Hidalgo County, Texas, pumping plants divert annually large amounts of water. During floods only a portion of the water discharges past this station through the channel of the Rio Grande, as the greater part finds outlet to the Gulf of Mexico through flood channels and floodways in both countries.

PREVIOUS EXTREME FLOWS: The highest previous recorded stage was on September 11, 1935, when a stage of 76.60 feet was reached, with a corresponding discharge of 40,000 second feet.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1											2,220	1,710
2											1,920	1,780
3											1,840	2,000
4											1,770	2,030
5											1,800	2,330
6											2,050	2,340
7											2,390	2,700
8											2,680	3,340
9											2,580	3,850
10											2,820	3,720
11											3,080	3,350
12											2,840	3,130
13											2,570	2,990
14											2,530	2,800
15											2,370	2,760
16											1,990	2,770
17											1,790	2,840
18											1,660	2,790
19											1,590	2,800
20											1,810	2,810
21											2,100	2,820
22											2,140	2,830
23											2,290	2,850
24										4,140	2,270	2,940
25										3,810	2,220	3,100
26										3,230	1,920	3,270
27										2,950	1,820	3,370
28										2,820	2,010	3,290
29										2,590	1,960	3,140
30										2,400	1,620	3,060
31										2,510		3,190

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	
October	*57.96	55.90	24	4,200	31	2,270	*3,060	*48,500	
November	56.80	54.50	11	3,090	30	1,580	2,160	128,000	
December	57.46	54.50	9	3,950	1	1,610	2,860	176,000	
The Period	57.96	54.50		4,200		1,580	2,580	352,500	

* 8 days - October 24 to October 31, 1937

RIO GRANDE AT MATAMOROS STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car and winch. The water-stage recorder is attached to the central pier of the railroad bridge over the Rio Grande between Matamoros, Tamaulipas and Brownsville, Texas, and 53.3 miles upstream from the Gulf of Mexico. The cable and car are located 0.3 mile upstream from the bridge. Zero of present gage is 15.26 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 156 meter measurements during the year. The river bottom shifts greatly at this station. Computations by shifting channel methods. 1937 records fair. Records available: 1901 to 1913; 1923 to December, 1937.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. Immediately above this station, particularly in Cameron and Hidalgo Counties, Texas, pumping plants divert annually large amounts of water. During floods only a portion of the water discharges past this station through the channel of the Rio Grande, as the greater part finds outlet to the Gulf of Mexico through flood channels and floodways in both countries. The gage datum was lowered five feet on October 3, 1930. With all closed basins eliminated, the drainage area above this station is 171,585 square miles; 91,124 being in the United States and 80,461 in Mexico.

PREVIOUS EXTREME FLOWS: The greatest previous flow recorded here was on June 22, 1903, when a mean daily flow of 36,200 second feet occurred, with a gage height of 13.2 feet. The highest gage reading was on June 18, 1935, when a reading of 22.28 feet present gage datum was reached. In 1930 the river at this station was dry for a few days in March and April.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,710	3,370	2,510	1,990	192	1,360	1,360	1,800	2,440	4,800	2,300	1,220
2	3,810	3,270	2,480	1,840	550	1,270	1,190	1,960	2,840	6,430	1,950	1,110
3	3,880	3,350	2,180	1,640	770	1,380	1,210	1,890	3,040	9,680	1,640	1,280
4	3,880	3,360	2,030	1,640	794	5,680	1,840	1,750	3,010	11,200	1,330	1,460
5	3,740	3,290	2,080	1,790	742	10,100	2,510	1,520	2,790	9,750	1,240	1,640
6	3,570	3,270	2,400	1,570	848	9,810	2,650	1,340	2,740	7,340	1,380	2,010
7	3,420	3,240	2,610	1,290	741	7,660	2,280	1,200	2,030	6,070	1,800	2,210
8	3,460	3,290	2,750	975	741	7,800	1,760	1,250	1,480	5,260	2,210	2,420
9	3,570	3,110	2,510	826	1,240	12,600	2,730	1,280	1,420	4,550	2,370	3,050
10	3,570	2,940	2,350	713	1,910	*11,600	4,340	847	1,710	4,230	2,260	3,670
11	3,570	2,940	2,380	749	2,450	* 9,180	4,520	681	1,760	4,200	2,440	3,850
12	3,570	2,970	2,490	1,120	2,820	* 6,920	4,940	508	1,600	5,010	2,720	3,640
13	3,530	2,940	2,540	1,090	2,820	* 5,440	6,180	554	1,400	14,900	2,660	3,300
14	3,440	2,970	2,740	1,150	2,580	4,450	6,070	455	1,000	9,820	2,520	3,040
15	3,370	3,000	2,780	1,120	2,310	3,810	5,690	508	642	5,610	2,440	2,930
16	3,140	2,870	2,510	770	2,980	3,180	4,870	784	353	4,550	2,100	3,050
17	3,240	2,550	2,410	770	4,630	2,570	3,850	614	236	4,020	1,840	2,930
18	3,370	2,480	2,180	932	4,770	2,120	3,280	352	498	3,630	1,250	2,790
19	3,370	2,620	1,870	1,220	3,570	2,030	2,870	2,200	1,060	3,450	1,360	2,680
20	3,180	2,680	1,890	1,050	3,240	1,970	2,670	4,770	4,100	4,230	1,260	2,790
21	3,160	2,680	2,180	826	2,750	2,150	2,980	3,880	5,510	5,930	1,460	2,830
22	2,900	2,720	2,370	524	2,300	2,030	3,190	2,760	4,980	6,350	1,840	2,870
23	2,720	2,650	2,450	382	2,040	1,520	2,820	1,910	4,130	5,720	1,910	2,790
24	2,870	2,420	2,660	361	1,960	1,090	2,420	1,200	3,180	4,870	2,140	2,790
25	3,140	2,230	2,520	446	1,710	902	2,310	642	2,480	4,380	2,140	2,930
26	3,180	2,030	2,390	566	1,360	891	2,470	296	2,380	3,630	1,890	3,270
27	3,220	2,010	2,160	565	1,000	1,120	2,310	180	2,930	2,930	1,590	3,370
28	3,040	2,230	2,130	424	788	1,560	1,910	146	6,390	2,450	1,520	3,290
29	3,160		2,260	226	712	1,660	1,680	135	6,920	2,260	1,730	3,140
30	3,290		2,260	118	974	1,560	1,550	664	5,720	2,130	1,590	3,140
31	3,370		2,130		1,240		1,550	1,770		2,180		3,110

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Normal 1924-1937
January	8.83	7.12	4	3,920	23	2,700	3,370	207,000	242,495
February	8.01	6.10	1	3,390	27	1,980	2,840	158,000	171,139
March	7.09	5.71	15	2,830	19	1,780	2,360	145,000	128,821
April	5.74	1.80	1	2,010	30	106	956	56,900	130,612
May	9.42	1.94	17	4,940	1	130	1,860	114,000	297,184
June	15.06	4.49	9	12,400	26	840	4,180	249,000	412,523
July	11.19	5.12	13	6,290	3	1,110	2,970	183,000	325,226
August	9.88	2.13	20	4,980	29	106	1,290	79,000	289,192
September	11.15	2.59	28	7,450	17	195	2,690	160,000	619,506
October	15.16	6.50	13	17,500	30	2,050	5,530	340,000	593,198
November	7.41	4.99	12	2,770	20	1,220	1,900	113,000	313,476
December	8.27	4.76	11	3,880	2	1,080	2,730	168,000	249,558
The Year	15.16	1.80		17,500		106	2,730	1,972,900	3,772,930

* Partly Estimated

RIO GRANDE AT LOWER BROWNSVILLE STATION

DESCRIPTION: Water-stage recorder and cable with sit down cable car, located about 1,000 feet below the El Jardin pumping plant and about 8.5 river miles below Brownsville, Texas, and Matamoros, Tamaulipas. Zero of gage is United States Coast and Geodetic Survey mean sea level datum.

RECORDS: Based upon 52 current meter measurements made during the year. Computations by shifting channel methods. 1937 records fair. Records available: January, 1934, to December, 1937.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and by large reservoirs in the United States and Mexico. Immediately above this station, particularly in Cameron and Hidalgo Counties, Texas, pumping plants divert annually large amounts of water. During floods only a portion of the water discharges past this station through the channel of the Rio Grande, as the greater part finds outlet to the Gulf of Mexico through flood channels and floodways in both countries. With all closed basins eliminated, the drainage area above this station is 171,585 square miles; 91,124 being in the United States and 80,461 in Mexico.

PREVIOUS EXTREME FLOWS: On June 10, 1935, a peak discharge of 31,000 second feet was reached with an estimated gage height of 32.10 feet. Additional data concerning peaks may be found in previous Water Bulletins. The river was dry at this station a few days in 1930 and March 25-28, 1935.

Mean Daily Discharge in Second Feet and Annual Summary, 1937

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,680	3,490	2,490	1,680	129	1,130	1,330	1,690	2,090	4,470	2,230	1,270
2	3,840	3,420	2,510	1,570	*500	1,090	1,100	1,850	*2,700	5,960	1,950	1,080
3	3,880	3,420	2,260	1,410	*700	1,020	1,100	1,740	*2,850	8,090	1,600	1,210
4	3,920	3,440	2,080	1,410	*750	4,920	1,790	1,660	*2,800	9,030	1,430	1,430
5	3,780	3,380	2,200	1,570	619	10,200	2,640	1,450	*2,650	8,620	1,320	1,650
6	3,580	3,320	2,360	1,400	703	10,700	2,780	1,230	2,520	7,380	1,470	1,980
7	3,350	3,310	2,480	1,100	743	8,500	2,570	1,090	2,010	6,030	1,700	2,210
8	3,370	3,310	2,580	*898	658	8,020	1,970	1,140	1,530	5,010	2,180	2,350
9	3,540	3,160	2,430	*741	*1,200	12,500	2,600	1,130	1,350	4,230	2,410	2,840
10	3,510	2,950	2,280	*659	*1,800	12,500	4,240	786	1,620	3,840	2,340	3,390
11	3,480	2,900	2,260	*700	*2,400	10,400	4,570	612	1,700	3,750	2,450	3,590
12	3,470	2,940	2,350	*1,000	*2,700	8,130	4,860	427	1,610	4,320	2,760	3,430
13	3,410	2,920	2,570	*1,020	2,560	6,490	6,500	472	1,430	9,380	2,760	3,190
14	3,370	2,950	2,490	*1,050	2,440	5,060	6,390	410	1,120	9,230	2,580	2,940
15	3,230	2,960	2,560	*1,050	1,890	4,020	5,800	472	667	5,730	2,510	2,850
16	3,060	2,840	2,330	690	*2,900	3,110	4,850	749	573	4,420	2,100	2,950
17	3,140	2,550	2,210	*750	*4,500	2,360	3,630	615	210	3,840	1,750	2,810
18	3,370	2,470	2,020	*900	*4,500	1,840	2,800	375	*650	3,570	1,240	2,680
19	3,330	2,590	1,780	*1,100	3,910	1,710	2,390	1,580	*1,450	3,350	1,190	2,620
20	3,180	2,640	1,740	*1,000	3,300	1,560	2,170	5,230	*3,900	4,010	1,130	2,680
21	3,150	2,650	1,940	*800	2,750	1,840	2,580	4,410	*4,950	5,890	1,270	2,750
22	2,980	2,700	2,110	480	2,350	1,820	2,990	3,120	4,280	6,480	1,640	2,770
23	2,780	2,640	2,180	316	2,060	1,420	2,760	2,250	3,500	5,830	1,790	2,730
24	2,880	2,440	2,300	288	1,970	989	2,280	1,520	2,780	5,240	1,990	2,710
25	3,120	2,250	2,230	312	1,750	799	2,140	880	*2,250	4,640	2,040	2,850
26	3,220	2,050	2,120	*500	1,420	727	2,300	322	*2,200	3,970	1,840	3,100
27	3,240	2,030	1,960	*520	990	947	2,160	158	*2,600	3,180	1,590	3,260
28	3,160	2,230	1,870	*350	769	1,490	1,810	*93.8	*6,000	2,580	1,440	3,200
29	3,270		1,970	*187	669	1,670	1,610	*74.9	*6,800	2,350	1,640	3,090
30	3,390		1,970	*123	778	1,580	1,480	343	5,060	2,210	1,600	3,050
31	3,480		1,840		1,000		1,510	1,400		2,190		3,040

Month	Extreme Gage Height—Feet		Extreme Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Average 1934 to 1937
January	19.39	17.57	4	3,940	23	2,740	3,360	207,000	222,500
February	18.49	16.36	1	3,520	27	1,990	2,860	159,000	162,500
March	17.42	15.92	15	2,590	19	1,680	2,210	136,000	123,425
April	16.11	*12.18	1	1,760	30	*92.0	852	50,700	123,675
May	19.77	12.00	18	4,390	1	90.0	1,790	110,000	331,250
June	25.74	14.25	9	13,100	26	703	4,280	255,000	447,000
July	21.58	14.95	13	6,740	3	1,030	2,890	178,000	350,000
August	20.15	*11.97	20	5,420	29	*73.3	1,270	77,900	169,225
September	21.73	12.39	29	7,000	18	162	2,530	150,000	549,500
October	25.58	16.55	13	10,900	31	2,150	5,120	315,000	432,500
November	17.37	14.69	12	2,850	20	1,690	1,860	111,000	198,500
December	18.34	14.33	11	3,620	2	1,040	2,640	162,000	200,950
The Year	25.74	*11.97		13,100		*73.3	2,640	1,911,600	3,311,025

* Partly Estimated

RIO CONCHOS NEAR OJINAGA, CHIHUAHUA

DESCRIPTION: The Rio Conchos enters the Rio Grande about 4 miles above the international highway bridge between Presidio, Texas, and Ojinaga, Chihuahua, and 1-1/2 miles above the Lower Presidio gaging station on the Rio Grande, and 8 miles below the Upper Presidio gaging station on the Rio Grande. No gaging station was maintained on the Rio Conchos, but the discharge records were calculated as mentioned below.

RECORDS: Based on discharge records of the Rio Grande at Upper Presidio and Lower Presidio stations; and irrigation diversions and arroyo inflow between these two stations. The normals shown here correspond with the revisions in Rio Conchos discharge shown in later pages of this bulletin. Records fair. Records available: 1924 to 1937.

REMARKS: The Boquilla storage reservoir, as well as many irrigation diversions on the Rio Conchos greatly modify the river flow. The Colina reservoir with 21,900 acre feet capacity, located about 10.5 miles downstream from Boquilla dam and the Rosetilla reservoir located about 52.7 miles farther downstream, with a capacity of 15,400 acre feet are used for power development only. The daily river flow may be modified by these reservoirs but the monthly flow is not. The drainage area of the Rio Conchos above its confluence with the Rio Grande is 22,600 square miles, entirely in Mexico.

PREVIOUS EXTREME FLOWS: The greatest previous recorded flow occurred September 11, 1904, when the estimated peak was about 170,000 second feet.

Month 1937	Extreme Gage Height—Feet		Extreme Second Feet **				Average Second Feet	Acre Feet	
			High		Low			Total	Normal 1924-1937
	High	Low	Dates		Dates				
January			12	1,100	16	556	781	48,200	54,147
February			28	1,210	5	601	839	46,600	41,557
March			12	1,100	29	266	576	35,400	40,258
April			1	419	27	77.3	198	11,800	31,318
May			4	2,030	10	121	330	20,300	36,444
June			2	6,760	29	222	605	36,000	43,115
July			21	2,120	3	202	613	37,700	58,606
August			22	7,540	18	19	472	29,000	110,749
September			24	*13,200	10	97	2,770	165,000	206,599
October			1	4,070	25	460	1,150	70,600	145,944
November			1	728	25	376	513	30,500	50,511
December			28	1,620	3	437	790	48,600	49,991
The Year				13,200		19	801	579,700	869,239

** Approximate only
* Partly Estimated

ARROYO LAS VACAS NEAR VILLA ACUNA, COAHUILA

Arroyo Las Vacas enters the Rio Grande immediately below Del Rio. No gaging station was maintained on this creek. The discharges shown below are approximate only. They represent estimates of a skilled hydrographer made merely by inspection of the stream on the occasions of visits to the Del Rio gaging station gage well.

The drainage area of Arroyo Las Vacas above its confluence with the Rio Grande is 154 square miles, entirely in Mexico.

Date 1937	Estimated Discharge in Sec. Ft.	Date 1937	Estimated Discharge in Sec. Ft.	Date 1937	Estimated Discharge in Sec. Ft.	Date 1937	Estimated Discharge in Sec. Ft.
Jan. 11	4	Apr. 9	3	June 7	3	Sept. 18	1.0
Jan. 25	4	Apr. 22	3	June 21	2.5	Sept. 24	.5
Feb. 8	4	Apr. 26	3	July 12	1.5	Sept. 30	1.0
Feb. 23	3	May 6	2.5	July 14	1.5	Oct. 30	.5
Mar. 8	4	May 11	2.5	July 23	1.5	Nov. 3	.5
Mar. 24	4	June 1	3	Aug. 26	1.0	Nov. 9	1.0
Mar. 30	4						

STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

The following data for El Vado reservoir on the Rio Chama is from the Middle Rio Grande Conservancy District, Albuquerque, New Mexico. The data for Elephant Butte reservoir on the Rio Grande and for McMillan, Avalon and Alamogordo reservoirs on the Pecos in New Mexico are from the United States Reclamation Bureau. The Red Bluff Water Power Control District, Pecos, Texas furnished the data for Red Bluff reservoir on the Pecos River in Texas. The data for Boquilla reservoir on the Rio Conchos in Chihuahua, are from the Compania Agricola y Fuerza Del Rio Conchos, S. A. The data for San Miguel and Centenario reservoirs on the Rio San Rodrigo in Coahuila, as well as for Don Martin reservoir on the Rio Salado are from the National Irrigation Commission of Mexico.

The monthly figures below represent the number of acre feet of water in storage on the last day of each month, and the capacities represent the capacities on the last day of the year. Storage began in the new Alamogordo reservoir in November 1937.

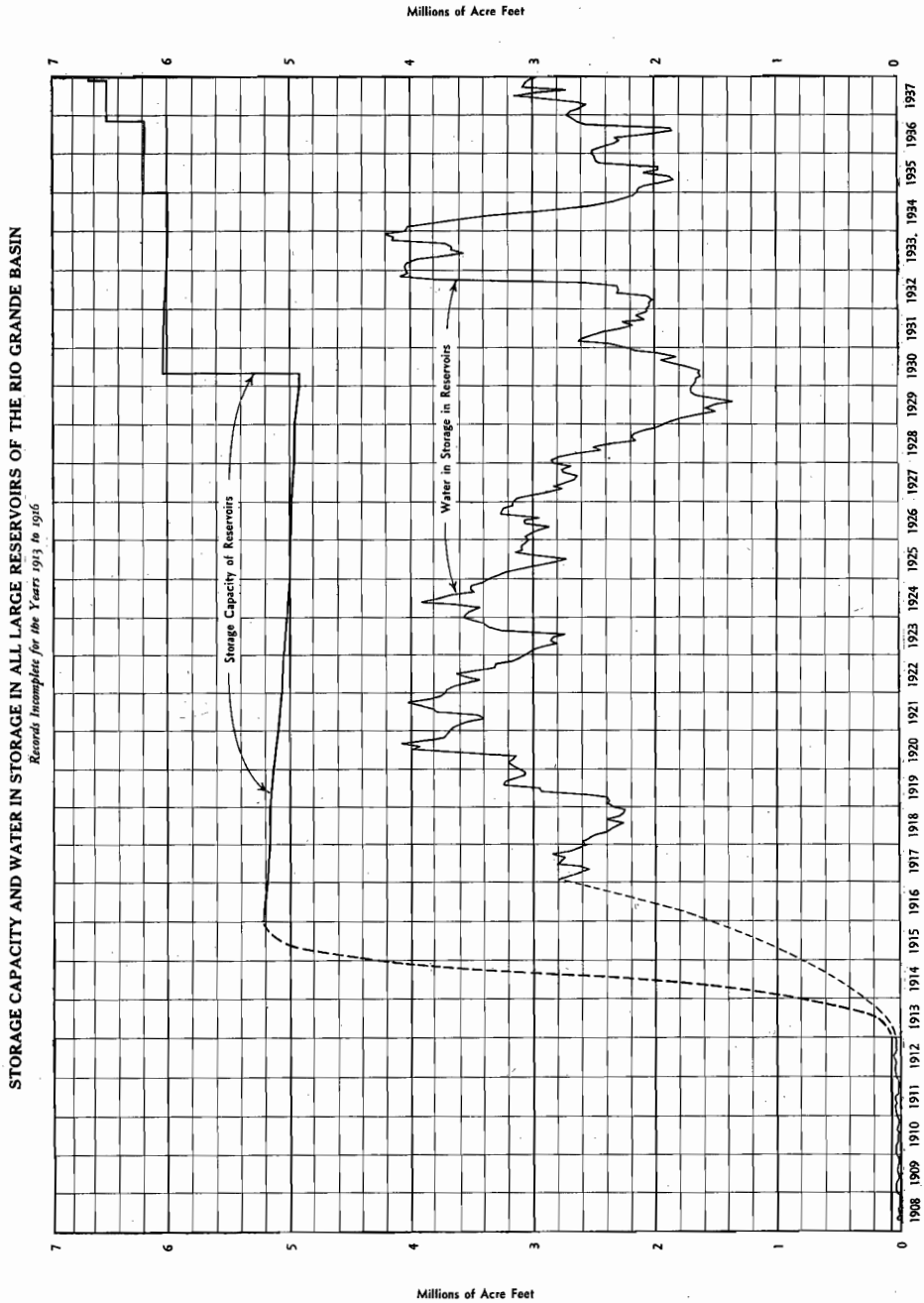
Month	El Vado		Elephant Butte		Boquilla	
	Acre Feet (Capacity 198,800)		Thousands of Acre Feet (Capacity 2,234)		Thousands of Acre Feet (Capacity 2,554)	
	1937	Average 1935 to 1937	1937	Normal 1924 to 1937	1937	Normal 1924 to 1937
Jan.	63,192	62,500	690	1,101	1,597	1,300
Feb.	56,328	62,500	746	1,112	1,546	1,270
Mar.	43,310	64,800	795	1,092	1,482	1,220
Apr.	150,468	124,000	897	1,095	1,413	1,150
May	175,050	166,000	1,263	1,214	1,329	1,080
June	164,250	155,000	1,374	1,216	1,233	1,020
July	129,480	131,000	1,301	1,130	1,199	1,040
Aug.	75,510	99,100	1,177	1,049	1,178	1,170
Sept.	38,210	77,300	1,135	1,020	1,594	1,370
Oct.	32,700	71,300	1,159	1,032	1,582	1,360
Nov.	26,976	65,700	1,152	1,046	1,545	1,320
Dec.	29,904	69,100	1,166	1,058	1,490	1,290
Yearly Change	-28,209		+ 504		-161	
Yearly Average	82,115	95,692	1,071	1,097	1,432	1,216

Month	Alamogordo		McMillan and Avalon		Red Bluff	
	Acre Feet (Capacity 157,000)		Acre Feet (Capacity 45,500)		Acre Feet (Capacity 300,000)	
	1937		1937	Normal 1924 to 1937	1937	Average 1936 to 1937
Jan.			24,600	37,900	15,923	
Feb.			26,200	37,200	24,188	
Mar.			24,300	32,600	32,333	
Apr.			17,800	20,900	15,877	
May			85,500	30,900	11,854	
June			38,800	23,600	275,533	
July			40,200	20,600	247,505	
Aug.			27,200	20,000	227,608	
Sept.			22,300	27,700	238,395	
Oct.			20,450	33,100	238,897	129,000
Nov.	20,685		22,350	33,500	236,272	131,000
Dec.	26,730		22,200	35,200	235,827	133,000
Yearly Change	+ 26,730		-2,800		+205,587	
Yearly Average			30,992	29,433	150,018	

Month	Centenario and San Miguel					Don Martin	
	Acre Feet (Capacity 17,025)					Thousands of Acre Feet (Capacity 1,123)	
	*1934	*1935	1936	1937	Average 1936 to 1937	1937	Average 1930 to 1937
Jan.	7,340	7,420	9,485 *	15,810	15,810 **	277	603
Feb.	8,050	8,590	8,675 *	12,120	12,120 **	204	582
Mar.	6,080	6,490	14,917	5,929	10,400	177	555
Apr.	5,590	5,470	10,904	3,730	7,320	123	537
May	6,320	5,590	13,417	3,530	8,470	90.2	514
June	4,180	8,720	12,323	1,540	6,930	48.7	514
July	2,720	10,100	15,849	608	8,220	47.0	506
Aug.	2,510	8,760	12,890	1,140	7,020	28.8	491
Sept.	3,650	9,080	16,782	3,120	9,950	29.2	570
Oct.	4,740	9,320	19,886	1,810	10,800	15.8	584
Nov.	4,680	9,570	19,461	2,014	10,700	9.49	604
Dec.	6,650	9,530	17,654	4,000	10,800	7.30	608
Yearly Change				-13,654		-265	
Yearly Average				4,613	9,878	88.1	556

* Centenario only

** Average for these months are for 1937 only


STORAGE CAPACITY AND WATER IN STORAGE IN ALL LARGE RESERVOIRS OF THE RIO GRANDE BASIN
Records Incomplete for the Years 1913 to 1916
Millions of Acre Feet
Storage Capacity of Reservoirs
Water in Storage in Reservoirs
0
1
2
3
4
5
6
7
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
Millions of Acre Feet

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS

The following discharge figures contain revisions of records previously published in Water Supply Papers of the United States Geological Survey, Water Bulletins of this Commission and unpublished records from the Commission's files. The revisions are based upon all available pertinent day by day records synchronized for time of water travel, also upon data concerning consumptive uses and overflows of flood water as well as upon criteria of dry weather losses and gains in the river channel developed from data collected in recent years. Because of the methods used in making the revisions, the monthly figures may contain some small errors which will tend to compensate out in the annual figures and will be most wholly eliminated in the figures for the entire period of revision. These revisions have of necessity been delayed until now because of previous lack of adequate criteria. The units used in the tables are acre feet.

Rio Grande at Upper Presidio Station**—1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	0	4,740	0	0	23,600	22,800	51,300
February	began	0	1,610	0	0	23,400	28,700	42,800
March	May 1	0	0	3,040	0	136,000	21,800	36,000
April		0	0	16,600	0	115,000	40,000	113,000
May	3,930	43,100	0	74,800	0	262,000	228,000	162,000
June	46,800	41,600	159	103,000	11,800	604,000	231,000	320,000
July	9,830	8,450	34,900	167,000	100	143,000	72,500	272,000
August	2,500	28,400	6,290	16,100	40	32,200	61,100	104,000
September	12,100	26,900	12,200	4,720	17,400	22,800	12,500	173,000
October	11,100	11,400	198	317	209,000	4,630	15,500	60,600
November	0	9,320	1,680	0	51,800	9,510	40,800	57,800
December	0	4,980	496	0	29,000	36,600	62,600	35,100
Total	86,260	174,150	62,273	385,577	319,140	1,412,740	837,300	1,427,600

Month	1908	1909	1910	1911	1912	1913	Normal
January	30,500	8,250	18,700	0	51,300	7,930	16,855
February	26,100	5,250	12,400	982	26,700	19,800	14,442
March	29,900	4,340	33,800	1,330	24,700	11,300	23,247
April	49,900	11,000	67,100	1,550	68,300	6,810	37,635
May	84,400	147,000	223,000	139,000	159,000	48,500	112,481
June	33,200	153,000	21,900	157,000	427,000	24,300	155,340
July	11,500	49,500	2,340	292,000	121,000	5,540	84,976
August	41,500	4,360	0	89,200	61,000	883	31,970
September	25,400	81,800	248	9,040	43,300	5,770	31,941
October	0	14,000	0	138,000	8,380	1,530	33,904
November	0	6,660	0	81,800	3,850	535	18,840
December	2,560	10,000	0	52,600	23,400	8,150	18,963
Total	334,960	495,160	379,488	962,502	1,017,930	141,048	580,594

Rio Conchos* near Ojinaga, Chihuahua —1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	11,100	11,200	22,000	11,000	44,600	89,200	38,200
February	began	17,400	6,230	64,000	6,810	43,200	187,000	22,000
March	May 1	12,200	3,610	27,100	4,670	44,000	79,200	11,600
April		2,420	1,450	7,500	1,520	28,200	24,700	3,200
May	12,900	1,200	674	5,500	5,230	21,100	13,100	10,100
June	15,400	3,100	2,010	47,300	38,300	53,400	23,400	24,400
July	270,000	52,200	328,000	25,300	37,400	192,000	557,000	63,500
August	378,000	80,900	344,000	95,200	56,400	407,000	1,080,000	135,000
September	160,000	103,000	627,000	144,000	1,460,000	446,000	433,000	353,000
October	94,200	63,100	79,300	119,000	399,000	285,000	112,000	81,700
November	24,400	26,000	33,400	23,200	105,000	251,000	46,100	257,000
December	14,600	13,500	29,800	15,500	98,000	261,000	43,400	246,000
Total	969,500	386,120	1,466,674	595,600	2,223,330	2,076,500	2,688,100	1,245,700

Month	1908	1909	1910	1911	1912	1913	Normal
January	39,900	30,800	72,700	2,230	37,400	18,300	32,972
February	23,100	25,800	34,200	9,620	27,600	68,100	41,158
March	10,100	12,500	17,100	6,450	18,700	95,700	26,379
April	1,300	10,000	18,300	10,600	5,100	10,900	9,630
May	4,000	20,100	1,100	53,100	8,100	13,000	12,086
June	7,300	28,400	46,500	220,000	6,400	37,000	39,494
July	73,200	311,000	129,000	230,000	14,600	26,000	164,943
August	346,000	401,000	43,400	151,000	305,000	67,100	277,857
September	388,000	366,000	125,000	250,000	594,000	143,000	399,429
October	32,900	57,500	31,300	164,000	173,000	20,900	122,350
November	24,800	27,200	14,800	106,000	42,000	4,040	70,353
December	29,800	60,000	5,140	60,400	31,900	4,750	65,271
Total	980,400	1,350,300	538,540	1,263,400	1,263,800	508,790	1,261,922

** At its present location except from September 26, 1905 to July 6, 1909 when station was located 8 miles farther upstream.

* The Rio Conchos flow calculated from records at Upper and Lower Presidio stations with allowances for diversions and arroyo inflow between these stations.

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS
continued

Rio Conchos* near Ojinaga, Chihuahua –1924 to 1937

Month	1924	1925	1926	1927	1928	1929	1930	1931
January	147,500	22,500	54,100	71,600	55,600	73,420	46,910	14,410
February	42,900	18,700	43,900	60,000	51,600	66,180	28,570	16,130
March	29,060	27,360	40,860	70,240	54,790	67,000	20,870	32,320
April	17,250	46,250	15,350	61,620	30,750	62,780	11,150	40,220
May	9,440	122,740	22,240	51,240	40,440	66,950	10,670	48,850
June	27,920	42,420	18,420	63,720	48,280	73,710	18,110	53,790
July	22,140	150,440	28,740	76,310	102,800	78,340	34,050	74,570
August	18,900	435,400	205,400	67,300	149,000	78,220	140,160	70,410
September	68,720	432,320	234,120	92,320	92,720	111,470	9,370	34,650
October	93,600	176,400	154,000	61,200	75,900	58,540	48,600	49,580
November	36,900	60,800	64,200	38,600	79,400	52,370	17,190	48,800
December	31,100	52,900	57,000	61,500	76,000	54,230	15,280	52,170
Total	545,430	1,588,230	938,330	775,650	857,280	843,210	400,930	535,900

Month	1932	1933	1934	1935	1936	1937	Normal
January	39,920	50,700	64,500	44,600	24,100	48,200	54,147
February	41;320	39,300	62,300	32,500	31,800	46,600	41,557
March	37,710	43,700	59,200	20,900	24,200	35,400	40,258
April	26,580	48,600	49,500	5,000	11,600	11,800	31,318
May	18,200	35,700	48,200	3,950	11,300	20,300	36,444
June	9,720	91,900	58,100	52,800	8,720	36,000	43,115
July	27,800	61,100	61,600	42,700	22,200	37,700	58,606
August	128,000	85,200	43,500	60,400	39,600	29,000	110,749
September	502,000	533,000	38,700	249,000	329,000	165,000	206,599
October	798,000	200,000	41,000	116,000	99,800	70,600	145,944
November	62,600	73,200	45,500	45,000	52,100	30,500	50,511
December	50,900	69,400	44,100	26,600	60,100	48,600	49,991
Total	1,742,750	1,331,800	616,200	699,450	714,520	579,700	869,239

Rio Grande at Lower Presidio Station –1924 to 1937

Month	1924	1925	1926	1927	1928	1929	1930	1931
January	174,800	45,000	76,400	82,100	67,200	83,900	59,100	24,500
February	72,300	36,200	57,700	70,100	63,600	75,000	38,600	26,300
March	70,500	47,300	57,800	76,300	60,000	75,600	27,500	40,000
April	52,700	55,900	54,700	66,000	43,400	66,300	16,900	66,500
May	61,700	150,400	77,200	57,300	66,600	81,600	16,100	71,950
June	64,000	69,600	80,200	75,500	51,200	79,000	46,400	56,900
July	79,300	172,100	96,700	78,700	104,600	87,100	45,500	91,110
August	45,900	509,000	286,600	105,100	223,700	140,300	181,000	101,360
September	120,200	514,800	280,600	137,700	122,500	130,500	16,000	52,410
October	116,300	223,000	232,000	93,300	97,300	98,000	92,500	64,480
November	50,900	82,500	88,400	65,400	105,300	76,300	30,500	59,040
December	52,400	67,200	78,700	80,500	94,600	67,400	28,900	62,450
Total	961,000	1,973,000	1,467,000	988,000	1,100,000	1,061,000	599,000	717,000

Month	1932	1933	1934	1935	1936	1937	Normal
January	48,780	65,000	76,200	45,200	33,800	56,500	67,034
February	51,360	53,200	77,900	33,900	38,500	51,700	53,311
March	47,810	55,400	73,600	21,200	28,800	37,200	51,358
April	27,550	51,500	53,000	4,460	11,000	11,200	41,508
May	19,900	39,800	49,700	3,660	12,300	19,900	52,008
June	10,100	106,000	58,700	62,300	9,250	49,300	58,461
July	34,400	80,100	60,800	45,300	23,900	43,800	74,529
August	170,000	96,400	45,200	73,500	50,900	38,000	147,640
September	542,000	566,000	41,800	318,000	395,000	204,000	245,822
October	859,000	223,000	41,000	139,000	125,000	107,000	179,349
November	84,800	90,500	45,500	51,900	63,400	46,400	67,203
December	72,200	84,200	44,500	35,900	73,000	64,000	64,711
Total	1,967,900	1,511,100	667,900	834,320	864,850	729,000	1,102,934

* The Rio Conchos flow calculated from records at Upper and Lower Presidio stations with allowances for diversions and arroyo inflow between these stations.

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS
Continued

Rio Grande at Lower Presidio* Station –1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	11,100	15,900	22,000	11,000	68,200	112,000	89,500
February	began	17,400	7,840	64,000	6,810	66,600	216,000	64,800
March	May 1	12,200	3,610	30,100	4,670	180,000	101,000	47,600
April		2,420	1,450	24,100	1,520	143,000	64,600	116,000
May	16,800	44,300	674	80,300	5,230	283,000	241,000	172,000
June	62,900	45,400	2,870	151,000	50,800	658,000	255,000	345,000
July	281,000	61,400	364,000	193,000	38,200	336,000	630,000	336,000
August	381,000	110,000	351,000	112,000	57,100	440,000	1,140,000	240,000
September	173,000	131,000	640,000	149,000	1,480,000	469,000	446,000	527,000
October	106,000	75,200	80,200	120,000	609,000	290,000	128,000	143,000
November	24,400	35,300	35,100	23,200	157,000	261,000	86,900	315,000
December	14,600	18,500	30,300	15,500	127,000	298,000	106,000	281,000
Total	1,059,700	564,220	1,532,944	984,200	2,548,330	3,492,800	3,526,500	2,676,900

Month	1908	1909	1910	1911	1912	1913	Normal
January	70,400	39,100	91,400	2,230	88,700	26,200	49,825
February	49,200	31,000	46,600	10,600	54,300	87,900	55,619
March	40,000	16,800	50,900	7,780	43,400	107,000	49,620
April	51,000	20,800	85,200	12,000	73,200	17,500	47,138
May	88,300	167,000	224,000	193,000	167,000	61,400	124,572
June	41,100	182,000	69,000	378,000	434,000	61,900	195,498
July	85,200	361,000	132,000	522,000	136,000	31,900	250,550
August	389,000	406,000	44,000	241,000	367,000	68,600	310,479
September	414,000	449,000	126,000	260,000	638,000	149,000	432,214
October	33,600	72,200	32,000	303,000	182,000	23,100	156,950
November	24,800	33,900	14,800	188,000	45,900	4,570	89,276
December	32,400	70,000	5,140	113,000	55,300	12,900	84,260
Total	1,319,000	1,848,800	921,040	2,230,610	2,284,800	651,970	1,846,001

Rio Grande at Langtry Station –1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	36,900	40,800	43,700	33,800	79,300	131,000	122,000
February	began	33,300	30,100	70,900	27,400	65,600	209,000	90,600
March	May 1	38,600	26,700	59,000	24,900	199,000	126,000	80,700
April		25,300	36,400	43,900	21,900	159,000	86,600	96,900
May	62,000	71,500	33,500	92,700	72,700	272,000	224,000	179,000
June	119,000	87,200	44,300	238,000	167,000	724,000	287,000	339,000
July	323,000	80,800	298,000	208,000	51,300	409,000	660,000	356,000
August	531,000	142,000	349,000	122,000	59,700	555,000	1,370,000	254,000
September	230,000	203,000	664,000	174,000	1,620,000	508,000	527,000	583,000
October	179,000	117,000	120,000	193,000	811,000	365,000	170,000	191,000
November	53,700	81,300	70,800	48,300	241,000	270,000	118,000	321,000
December	41,700	42,000	56,400	39,500	137,000	321,000	142,000	317,000
Total	1,539,400	958,900	1,770,000	1,333,000	3,267,700	3,926,900	4,050,600	2,930,200

Month	1908	1909	1910	1911	1912	1913	Normal
January	108,000	42,400	122,000	29,500	106,000	67,300	74,054
February	76,600	35,700	58,600	34,600	72,000	105,000	69,954
March	61,400	31,500	63,000	32,800	50,900	130,000	71,115
April	69,100	26,200	90,100	51,700	96,700	53,000	65,908
May	91,100	149,000	227,000	336,000	165,000	91,200	147,621
June	86,300	229,000	111,000	309,000	436,000	150,000	237,629
July	164,000	465,000	140,000	520,000	156,000	72,800	278,850
August	602,000	457,000	52,800	296,000	377,000	82,200	374,979
September	518,000	457,000	163,000	272,000	777,000	245,000	495,786
October	69,100	116,000	56,700	309,000	242,000	84,300	215,936
November	44,000	61,700	35,000	221,000	76,700	40,400	120,207
December	174,000	66,000	34,300	127,000	91,400	54,700	117,429
Total	2,063,600	2,136,500	1,153,500	2,538,600	2,646,700	1,175,900	2,269,468

* See previous Water Bulletins for changes in station location.

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS

Continued

Pecos River Station near Comstock, Texas –1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	31,200	41,500	32,200	12,600	37,200	51,000	35,300
February	began	31,300	31,000	30,300	11,500	42,900	43,300	33,100
March	May 1	27,200	25,900	29,700	10,500	83,200	34,100	30,500
April		18,200	24,500	14,500	7,840	99,300	29,600	25,820
May	50,100	21,400	39,300	22,600	20,400	103,000	41,300	25,900
June	50,100	19,100	19,000	60,100	104,000	104,000	49,300	24,700
July	34,100	20,900	54,400	34,000	29,900	65,600	52,200	19,900
August	30,600	42,300	66,000	13,400	14,900	161,000	222,000	16,900
September	57,800	77,100	40,300	18,100	105,000	55,800	38,200	14,200
October	92,900	34,500	26,400	11,900	167,000	37,900	33,100	36,500
November	49,300	85,400	25,300	13,100	91,200	39,800	31,300	86,900
December	30,100	48,600	25,500	14,500	48,900	75,000	43,600	53,400
Total	395,000	457,200	419,100	294,400	623,740	904,700	669,000	403,120

Month	1908	1909	1910	1911	1912	1913	Normal
January	47,200	26,100	19,100	14,800	18,600	18,800	29,662
February	31,800	18,400	16,900	25,800	16,200	14,400	26,685
March	24,800	18,100	15,900	17,200	16,600	14,800	26,808
April	45,400	14,600	16,100	50,800	17,100	63,100	32,835
May	22,100	18,100	16,600	36,300	11,500	92,800	37,243
June	20,100	17,700	11,300	16,300	12,100	50,500	39,879
July	64,700	24,600	10,600	13,900	10,000	41,500	34,021
August	44,200	31,200	24,100	53,300	9,000	16,300	53,229
September	52,900	23,400	73,300	14,400	8,300	45,900	44,621
October	25,200	17,300	25,800	15,300	10,200	27,800	40,129
November	22,900	18,600	17,500	14,400	12,300	37,600	38,971
December	21,300	23,400	14,200	17,800	17,400	27,800	32,964
Total	422,600	251,500	261,400	290,300	159,300	451,300	437,047

Devils River Station near Del Rio, Texas –1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	51,100	30,000	27,800	33,100	27,400	28,000	42,600
February	Began	44,500	26,600	24,600	29,900	24,000	23,400	36,500
March	May 1	46,000	30,400	29,300	30,900	34,100	24,300	37,900
April		40,800	27,900	25,100	31,100	65,900	23,900	32,600
May	81,200	40,900	50,100	32,200	31,900	52,400	24,800	31,800
June	90,200	35,900	29,200	76,300	34,400	56,300	45,900	31,000
July	59,600	35,800	27,200	37,400	29,500	41,700	81,700	33,700
August	69,700	34,200	25,500	32,600	28,500	34,500	169,000	32,300
September	276,000	31,500	30,400	34,800	35,500	43,800	55,100	30,800
October	74,800	32,000	26,600	37,100	35,100	36,500	48,800	37,300
November	64,000	30,700	29,500	34,200	29,500	30,600	42,400	40,600
December	54,000	30,100	25,400	33,800	28,300	35,800	42,800	34,000
Total	769,500	453,500	358,800	425,200	377,700	483,000	610,100	421,100

Month	1908	1909	1910	1911	1912	1913	Normal
January	31,300	28,300	25,300	23,400	24,200	20,400	30,223
February	29,400	23,900	22,200	25,000	22,100	17,900	26,923
March	30,700	25,800	23,700	30,200	23,000	18,000	29,562
April	34,200	25,000	34,400	43,000	23,800	16,600	32,638
May	41,600	24,100	62,400	27,300	21,100	68,200	42,143
June	36,100	23,300	26,100	23,000	20,300	23,000	39,357
July	42,900	37,900	25,600	23,200	17,300	24,300	36,986
August	39,800	32,400	24,900	20,400	18,500	24,300	41,900
September	30,200	28,400	50,200	18,200	22,300	22,500	50,693
October	29,600	24,500	32,900	20,400	22,000	33,800	35,100
November	28,300	24,000	23,600	22,000	18,900	48,500	33,343
December	29,300	25,000	23,600	26,100	20,600	51,300	32,864
Total	403,400	322,600	374,900	302,200	254,100	368,800	431,732

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS
Continued

Rio Grande at Del Rio Station* –1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	140,000	125,000	127,000	99,200	156,000	223,000	201,000
February	Began	125,000	107,000	141,000	86,200	140,000	314,000	165,000
March	May 1, 1900	134,000	98,100	141,000	84,100	343,000	214,000	151,000
April		102,000	91,400	97,600	78,700	317,000	161,000	160,000
May	218,000	145,000	192,000	169,000	130,000	426,000	280,000	279,000
June	265,000	163,000	99,900	373,000	304,000	1,190,000	375,000	447,000
July	400,000	144,000	419,000	297,000	171,000	640,000	784,000	471,000
August	648,000	243,000	447,000	186,000	120,000	789,000	1,840,000	319,000
September	604,000	353,000	772,000	261,000	1,970,000	642,000	747,000	677,000
October	353,000	221,000	187,000	254,000	1,100,000	484,000	273,000	339,000
November	189,000	216,000	143,000	120,000	359,000	370,000	196,000	511,000
December	152,000	135,000	128,000	107,000	215,000	440,000	247,000	491,000
Total	2,829,000	2,121,000	2,809,400	2,273,600	4,717,200	5,937,000	5,654,000	4,211,000

Month	1908	1909	1910	1911	1912	1913	Normal
January	207,000	115,000	167,000	76,400	153,000	110,000	146,123
February	155,000	94,900	105,000	106,000	113,000	143,000	138,085
March	131,000	94,400	114,000	98,100	94,200	171,000	143,685
April	162,000	80,600	164,000	166,000	162,000	129,000	143,946
May	284,000	193,000	281,000	345,000	193,000	281,000	244,000
June	183,000	278,000	180,000	334,000	477,000	269,000	352,707
July	269,000	613,000	188,000	524,000	200,000	156,000	376,857
August	700,000	520,000	102,000	385,000	433,000	139,000	490,786
September	612,000	499,000	330,000	338,000	883,000	308,000	642,571
October	149,000	178,000	157,000	382,000	313,000	212,000	328,714
November	111,000	122,000	89,200	280,000	116,000	164,000	213,300
December	113,000	105,000	83,300	184,000	132,000	167,000	192,807
Total	3,076,000	2,892,900	1,960,500	3,218,500	3,269,200	2,249,000	3,413,581

Rio Grande at Eagle Pass Station –1900 to 1913

Month	1900	1901	1902	1903	1904	1905	1906	1907
January	Record	188,000	126,000	147,000	123,000	212,000	258,000	275,000
February	Began	147,000	105,000	153,000	106,000	179,000	328,000	224,000
March	April 14	140,000	98,300	154,000	102,000	399,000	235,000	189,000
April		115,000	91,000	129,000	93,800	356,000	154,000	182,000
May	542,000	191,000	238,000	239,000	133,000	488,000	302,000	290,000
June	354,000	201,000	98,100	549,000	350,000	1,310,000	394,000	456,000
July	510,000	146,000	375,000	379,000	190,000	935,000	1,010,000	486,000
August	774,000	261,000	429,000	223,000	113,000	891,000	1,850,000	317,000
September	780,000	333,000	770,000	327,000	2,120,000	688,000	884,000	689,000
October	524,000	212,000	190,000	323,000	1,150,000	581,000	381,000	344,000
November	328,000	217,000	142,000	148,000	410,000	414,000	272,000	531,000
December	253,000	138,000	179,000	134,000	236,000	442,000	338,000	513,000
Total	4,065,000	2,289,000	2,811,400	2,905,000	5,126,800	6,895,000	6,406,000	4,496,000

Month	1908	1909	1910	1911	1912	1913	Normal
January	250,000	137,000	186,000	78,100	161,000	119,000	173,854
February	174,000	114,000	117,000	102,000	123,000	143,000	155,000
March	148,000	113,000	118,000	108,000	92,100	174,000	159,262
April	201,000	97,800	184,000	161,000	147,000	121,000	156,354
May	344,000	187,000	291,000	319,000	184,000	299,000	286,929
June	191,000	310,000	198,000	321,000	616,000	317,000	404,650
July	250,000	615,000	212,000	493,000	224,000	183,000	429,143
August	746,000	579,000	90,000	424,000	359,000	145,000	514,357
September	660,000	527,000	386,000	353,000	889,000	308,000	693,857
October	182,000	209,000	176,000	447,000	332,000	236,000	377,643
November	133,000	137,000	94,800	300,000	130,000	179,000	245,414
December	135,000	121,000	87,600	198,000	142,000	221,000	224,114
Total	3,414,000	3,146,800	2,140,400	3,304,100	3,399,100	2,445,000	3,820,577

* See previous Water Bulletins for changes in station location.

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS

Continued

Rio Grande at Laredo Station – 1900 to 1913

Month	1900 †	1901	1902	1903 †	1904 †	1905 †	1906 †	1907 †
January	Record	ø 188,000	ø 128,000	ø 154,000	138,000	197,000	290,000	293,000
February	Began	ø 147,000	ø 105,000	ø 155,000	126,000	161,000	316,000	234,000
March	May 1	ø 141,000	ø 98,000	ø 157,000	103,000	364,000	236,000	191,000
April		ø 115,000	ø 96,000	ø 129,000	190,000	350,000	162,000	192,000
May	730,000	ø 202,000	ø 221,000	ø 281,000	156,000	492,000	351,000	325,000
June	490,000	ø 200,000	ø 98,000	ø 649,000	286,000	1,190,000	376,000	486,000
July	559,000	ø 147,000	ø 359,000	ø 479,000	217,000	944,000	1,000,000	521,000
August	855,000	ø 258,000	ø 431,000	238,000	113,000	924,000	1,640,000	310,000
September	884,000	ø 333,000	ø 779,000	481,000	2,130,000	740,000	954,000	678,000
October	∂ 562,000	ø 212,000	ø 220,000	339,000	1,120,000	616,000	407,000	364,000
November	∂ 345,000	ø 224,000	ø 157,000	151,000	446,000	415,000	286,000	514,000
December	ø 281,000	ø 147,000	ø 179,000	130,000	326,000	478,000	331,000	530,000
Total	∂4,706,000	ø2,314,000	ø2,871,000	∂3,343,000	5,351,000	6,871,000	6,349,000	4,638,000

Month	1908 †	1909 †	1910 †	1911 †	1912 †	1913 †	Normal
January	278,000	142,000	182,000	79,900	166,000	131,000	182,069
February	177,000	123,000	118,000	109,000	121,000	151,000	157,154
March	148,000	144,000	108,000	117,000	98,300	208,000	162,562
April	343,000	118,000	202,000	161,000	168,000	130,000	181,231
May	305,000	203,000	290,000	342,000	205,000	266,000	312,071
June	181,000	297,000	190,000	327,000	694,000	316,000	412,857
July	197,000	600,000	200,000	523,000	253,000	189,000	442,000
August	740,000	579,000	93,200	434,000	360,000	144,000	508,514
September	704,000	524,000	360,000	328,000	835,000	311,000	717,214
October	198,000	230,000	208,000	498,000	357,000	342,000	405,214
November	136,000	140,000	93,000	325,000	143,000	222,000	256,929
December	130,000	121,000	90,700	201,000	174,000	271,000	242,121
Total	3,537,000	3,221,000	2,134,900	3,444,900	3,574,300	2,681,000	3,979,936

Rio Salado Station at Cd. Guerrero, Tamaulipas – 1900 to 1913

Month	1900 †	1901 †	1902 †	1903 †	1904 †	1905 †	1906 †	1907 †
January	Record	14,800	6,110	2,170	2,630	44,700	17,200	42,900
February	Began	8,210	3,930	307	2,730	22,700	16,900	30,700
March	April 24	5,000	2,180	ø 300	962	44,500	10,300	24,700
April		2,380	15,400	∂ 4,200	4,160	20,800	9,200	18,100
May	∂ 103,000	100,000	14,700	18,800	78,300	68,000	14,300	34,200
June	∂ 77,300	35,100	1,710	289,000	54,700	69,300	1,840	16,600
July	∂ 99,900	7,100	2,330	99,900	932	183,000	390,000	59,100
August	∂ 143,000	883	843	86,500	3,230	83,300	180,000	12,800
September	∂ 77,700	28,800	37,400	20,200	435,000	98,600	209,000	5,110
October	∂ 62,000	41,600	94,000	31,200	222,000	82,100	128,000	88,400
November	ø 12,300	48,300	6,620	6,780	129,000	39,500	86,100	97,800
December	∂ 20,400	12,200	21,100	1,060	81,000	27,300	61,900	63,700
Total	∂ 595,600	304,373	206,323	560,417	1,014,644	783,800	1,124,740	494,110

Month	1908 †	1909 †	1910 †	1911 †	1912 †	1913 †	Normal
January	39,800	6,910	34,100	24,300	5,220	6,530	19,028
February	18,300	3,870	10,700	12,800	3,970	4,160	10,714
March	14,300	1,650	23,800	18,600	2,700	2,330	11,640
April	49,100	4,930	11,100	18,500	2,570	40	12,345
May	28,300	43,100	8,220	16,400	13,300	0	38,616
June	12,800	7,580	42,200	6,580	161,000	55,000	59,336
July	17,400	375,000	2,720	9,020	9,040	∂ 23,000	91,317
August	103,000	210,000	297	5,880	1,660	ø 4,000	59,671
September	49,600	232,000	330,000	21,500	0	ø 167,000	122,279
October	40,800	54,800	66,800	31,300	50,400	ø 312,000	93,243
November	8,530	41,100	38,600	24,000	11,700	ø 15,000	40,381
December	7,590	38,400	32,100	3,410	9,140	ø 0	27,093
Total	389,520	1,019,340	600,637	192,290	270,700	∂ 589,060	585,663

ø Original record missing - this record estimated.
∂ Part of original record missing - part of this record estimated.
† From original records in I. B. C. files not previously published.

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS

Continued

Rio Grande at Roma Station –1900 to 1913

Month	1900 †	1901 †	1902 †	1903 †	1904 †	1905 †	1906 †	1907 †
January	Record	201,000	137,000	167,000	136,000	277,000	367,000	343,000
February	Began	155,000	116,000	158,000	115,000	191,000	352,000	272,000
March	August 5	155,000	102,000	ϕ 161,000	107,000	474,000	277,000	222,000
April		122,000	159,000	8 102,000	152,000	462,000	168,000	198,000
May		360,000	310,000	362,000	290,000	630,000	368,000	406,000
June		263,000	101,000	1,090,000	417,000	1,030,000	449,000	515,000
July		141,000	348,000	729,000	251,000	1,240,000	1,300,000	695,000
August		284,000	466,000	434,000	122,000	1,000,000	1,760,000	322,000
September	907,000	370,000	800,000	465,000	2,420,000	903,000	1,230,000	703,000
October	766,000	282,000	422,000	398,000	1,500,000	739,000	624,000	495,000
November	346,000	293,000	177,000	163,000	708,000	461,000	495,000	613,000
December	279,000	171,000	246,000	143,000	457,000	557,000	630,000	593,000
Total	2,298,000	2,797,000	3,384,000	8 4,372,000	6,675,000	7,964,000	8,020,000	5,377,000

Month	1908 †	1909 †	1910 †	1911 †	1912 †	1913 †	Normal
January	326,000	151,000	256,000	103,000	169,000	145,000	213,692
February	191,000	123,000	150,000	129,000	130,000	149,000	171,615
March	163,000	137,000	155,000	143,000	101,000	206,000	184,846
April	460,000	119,000	258,000	184,000	168,000	125,000	205,923
May	373,000	216,000	391,000	390,000	212,000	291,000	353,769
June	200,000	327,000	265,000	390,000	1,060,000	400,000	500,538
July	270,000	1,370,000	248,000	541,000	279,000	222,000	587,231
August	863,000	1,140,000	84,800	439,000	345,000	149,000	569,908
September	742,000	1,020,000	1,140,000	394,000	825,000	540,000	889,929
October	265,000	270,000	341,000	705,000	462,000	863,000	580,857
November	151,000	168,000	133,000	359,000	162,000	243,000	319,429
December	135,000	170,000	118,000	204,000	178,000	267,000	296,286
Total	4,139,000	5,211,000	3,539,800	3,981,000	4,091,000	3,600,000	4,874,023

Rio San Juan*Station at Santa Rosalia, Tamaulipas –1900 to 1913

Month	1900 †	1901 †	1902 †	1903 †	1904 †	1905 †	1906 †	1907 †
January	Record	13,500	16,300	3,350	2,260	8,480	18,000	12,000
February	Began	6,580	8,650	982	2,700	4,770	28,900	5,810
March	April 28	3,250	2,940	ϕ 1,000	1,980	23,100	22,100	1,560
April		774	39,700	ϕ 1,000	27,500	4,810	34,000	6,430
May		16,900	31,600	17,700	61,500	15,000	19,400	146,000
June		101,000	218	50,100	62,200	86,100	9,800	29,000
July		70,300	32,200	36,800	17,800	54,900	42,500	103,000
August		2,370	17,300	235,000	21,600	2,570	113,000	843
September		123,000	50,800	26,500	418,000	50,100	132,000	8,420
October	5,810	131,000	147,000	5,340	46,700	87,000	43,800	15,300
November	9,650	64,500	7,530	3,070	17,000	204,000	22,000	10,400
December	34,400	40,200	34,800	2,640	22,700	57,200	23,400	16,500
Total	49,860	573,374	389,038	383,482	701,940	598,030	508,900	355,263

Month	1908 †	1909 †	1910 †	1911 †	1912 †	1913 †	Normal
January	5,980	3,080	30,900	14,800	2,240	11,700	10,968
February	4,030	575	12,000	4,510	1,840	6,740	6,776
March	922	79	9,890	36,900	1,540	3,880	8,395
April	91,600	4,760	19,100	85,600	9,070	1,290	25,049
May	58,300	11,500	12,400	73,200	2,060	8 13,700	36,866
June	29,400	5,440	12,100	4,610	225,000	8 159,000	59,536
July	30,100	241,000	3,250	2,030	28,800	8 61,700	55,722
August	14,500	1,460,000	1,230	1,580	2,250	8 44,100	147,411
September	7,070	500,000	193,000	2,130	15,100	8 209,000	133,471
October	9,240	79,600	75,400	17,900	64,100	8 387,000	79,656
November	30,200	53,500	40,400	49,600	30,000	8 79,000	44,346
December	2,550	41,200	27,000	6,420	25,500	8 39,000	26,679
Total	283,892	2,400,734	436,670	299,280	407,500	1,016,110	634,875

ϕ Original record missing - this record estimated.
8 Part of original record missing, part of this record estimated.
† From original records in I. B. C. files not previously published.
* See previous Water Bulletins for changes in station location.

REVISED MONTHLY AND ANNUAL DISCHARGES WITH NORMALS
Continued

Rio Grande at Matamoros Station – 1900 to 1913

Month	1900 †	1901 †	1902 †	1903 †	1904 †	1905 †	1906 †	1907 †
January	Record	204,000	158,000	156,000	123,000	302,000	411,000	340,000
February	Began	154,000	115,000	138,000	112,000	192,000	308,000	275,000
March	May 1	149,000	101,000	159,000 ϕ	94,700	442,000	308,000	224,000
April		111,000	149,000	98,000 ϕ	137,000	423,000	191,000	181,000
May	991,000 ȣ	297,000	228,000	331,000	274,000	591,000	346,000	517,000
June	753,000 ȣ	213,000	83,600	949,000	394,000	947,000	429,000	490,000
July	668,000 ȣ	213,000	208,000	641,000	311,000	1,100,000	1,230,000	690,000
August	1,180,000 ȣ	231,000	457,000	740,000	147,000	1,010,000	1,490,000	315,000
September	895,000 ȣ	458,000	824,000	531,000	1,200,000	803,000	1,390,000	647,000
October	781,000 ȣ	398,000	517,000	414,000	1,610,000	776,000	726,000	480,000
November	369,000 ϕ	342,000	184,000	181,000	810,000	578,000	431,000	589,000
December	289,000 ȣ	230,000	242,000	136,000	509,000	548,000	467,000	591,000
Total	5,926,000 ȣ	3,000,000	3,266,600	4,474,000	5,721,700	7,712,000	7,727,000	5,339,000

Month	1908 †	1909 †	1910 †	1911 †	1912 †	1913 †	Normal
January	324,000	134,000	236,000	113,000	154,000	145,000	215,385
February	147,000	107,000	140,000	94,200	122,000	116,000	155,400
March	138,000	113,000	117,000	123,000	84,500	197,000	173,092
April	449,000	104,000	205,000	199,000	135,000	79,400	189,308
May	374,000	157,000	251,000	364,000	160,000	289,000 ȣ	369,286
June	219,000	313,000	190,000	315,000	693,000	346,000 ϕ	452,471
July	236,000	1,200,000	178,000	423,000	328,000	322,000 ϕ	553,429
August	842,000	1,020,000	51,500	460,000	249,000	161,000 ȣ	596,679
September	756,000	1,470,000	856,000	344,000	864,000	378,000 ȣ	815,429
October	261,000	463,000	449,000	576,000	627,000	1,360,000 ȣ	674,143
November	162,000	230,000	163,000	451,000	169,000	320,000 ȣ	355,643
December	111,000	193,000	136,000	200,000	179,000	372,000 ȣ	300,214
Total	4,019,000	5,504,000	2,972,500	3,662,200	3,764,500	4,085,400	4,850,479

ϕ Original record missing - this record estimated.
ȣ Part of original record missing - part of this record estimated.
† From original records in I. B. C. files not previously published.

OLD DISCHARGE RECORDS MISSING

Rio Grande at San Marcial Station

The record for San Marcial gaging station is missing for January, September, October, November, and December, 1895, but from a study of pertinent precipitation records and discharge records at Embudo and Buckman it is estimated that the total flow passing San Marcial during these 5 months was 200,000 acre feet. This estimate was used in determining the 43 year normal flow at San Marcial.

Rio Grande at El Paso Station

The record at El Paso station is missing for the following periods. It is estimated that the amounts shown below represent the total flow in acre feet during these periods. These estimates are based upon the most pertinent upstream discharge record available for the period. These up-stream records were from gaging stations at Elephant Butte Dam, San Marcial, Embudo and Del Norte.

January 1 to May 9, 1889 - - 179,300 acre feet
July 1 to December 31, 1893 - 60,000 acre feet
The Year 1894 - - - - - - - - - 400,000 acre feet
The Year 1895 - - - - - - - - - 950,000 acre feet
The Year 1896 - - - - - - - - - 295,000 acre feet
December 1915 - - - - - - - - - 28,500 acre feet

The El Paso station record for the 4 months April to July 1914 have not heretofore been published. This record from the old files of this Commission is set out below. This record and the above mentioned estimates were used in determining the 49 year normal flow at El Paso station.

Mean Daily Discharge in Second Feet and Summary, 1914

Day	April	May	June	July	Day	April	May	June	July
1	285	2,000	5,540	1,200	16	1,450	5,850	2,280	195
2	315	1,990	5,420	1,590	17	1,390	6,930	2,130	195
3	380	1,830	5,200	1,780	18	1,180	7,670	3,210	195
4	720	1,750	5,090	2,170	19	1,140	7,130	2,100	3,600
5	570	1,750	5,040	1,160	20	1,390	6,600	1,970	5,300
6	495	2,280	5,200	760	21	1,490	5,880	1,640	4,170
7	345	2,520	5,580	700	22	1,540	5,470	2,070	3,530
8	270	2,110	5,860	2,410	23	2,060	4,860	1,900	4,430
9	235	1,760	5,580	2,130	24	1,490	4,450	1,940	4,450
10	235	1,760	5,690	1,590	25	1,580	4,650	2,160	3,680
11	370	1,800	6,040	1,490	26	1,900	4,520	2,050	3,560
12	2,130	2,160	8,350	925	27	1,970	4,980	2,220	5,570
13	2,150	3,100	5,960	570	28	2,100	5,320	2,290	4,040
14	1,940	5,670	3,950	470	29	1,950	6,220	2,050	3,390
15	1,810	5,770	4,580	455	30	1,940	5,990	1,620	4,040
					31		5,990		4,370

Month	Extreme Gage Height—Feet		Mean Daily Second Feet				Average Second Feet	Acre Feet	
			High		Low				
	High	Low	Dates		Dates			Total	Per Sq. Mile
April			13	2,150	9-10	235	1,230	73,000	
May			18	7,670	4-5	1,750	4,220	259,000	
June			12	8,350	30	1,620	3,820	228,000	
July			27	5,570	16-18	195	2,390	147,000	

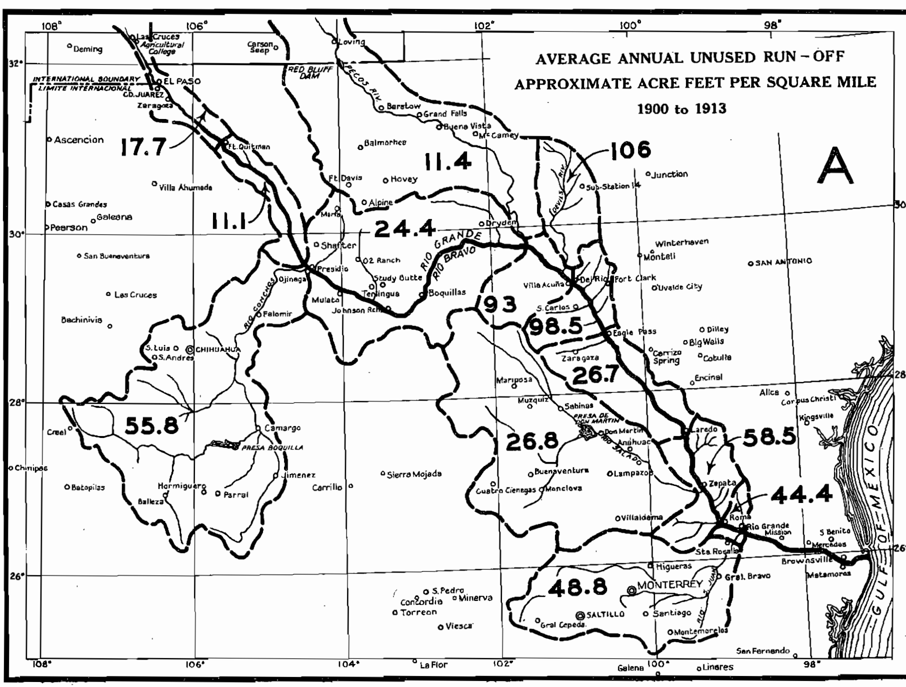
SOURCES OF RIVER FLOW

1900 to 1913
and
1924 to 1937

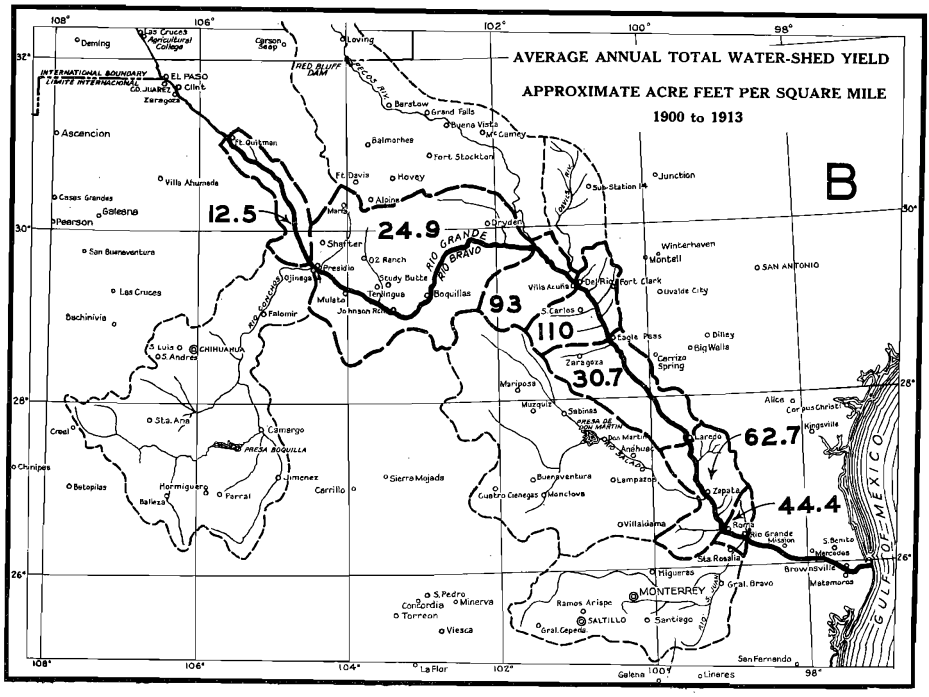
Three of the maps presented below pertain to the 14 year period 1900 to 1913 and three to the 14 year period 1924 to 1937.

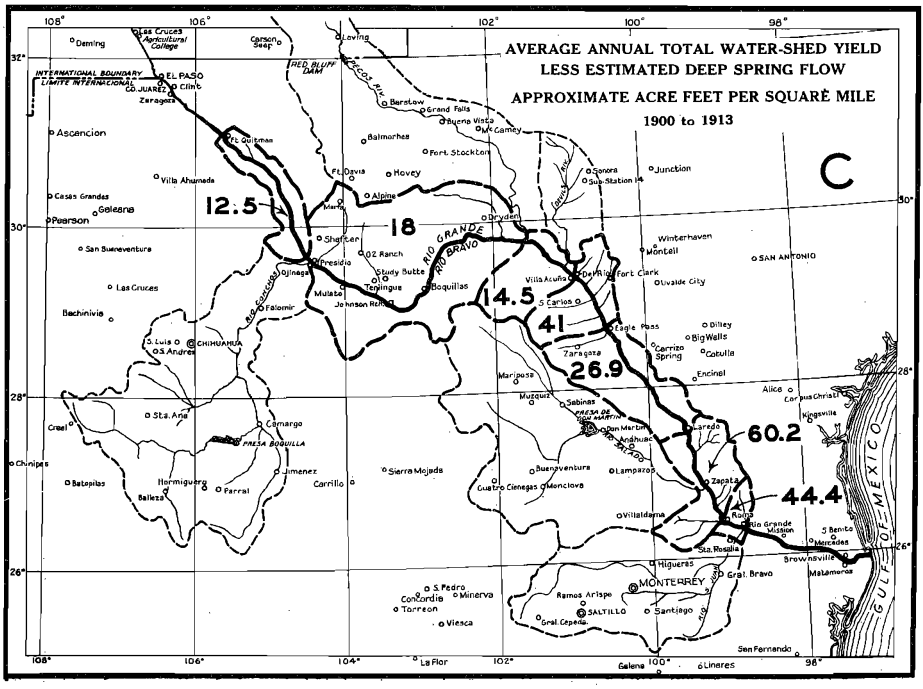
By means of bold figures expressing approximate acre feet per square mile they show for sub-divisions of the Rio Grande basin below Fort Quitman, "A" "Average Annual Unused Run-Off", "B" "Average Annual Total Water-Shed Yield" and "C" "Average Annual Total Water-Shed Yield Less Estimated Deep Spring Flow." The maps marked "B" and "C" do not include figures for the large tributaries.

The bold figures shown on the maps marked "A" represent unused run-off as distinguished from unused stream flow. This distinction is made clear in the statement on page 56. The bold figures shown on the maps marked "B" are the same figures as used on the "A" maps to which have been added the estimated amount of water consumed by irrigation and reservoir evaporation within each sub-division. The figures on the "C" maps are the same as those on the "B" maps less the estimated deep spring flow.

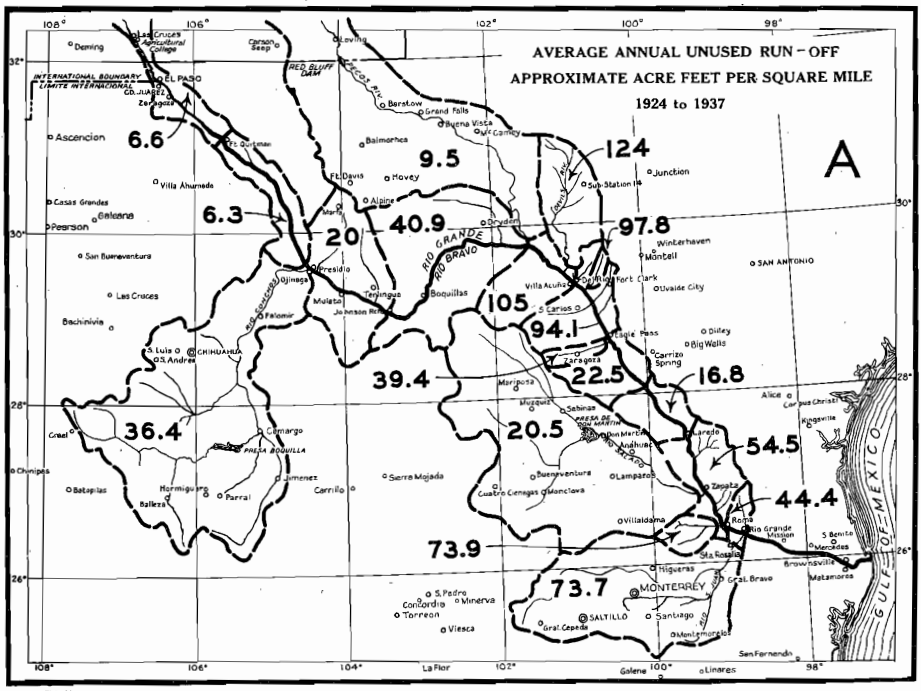


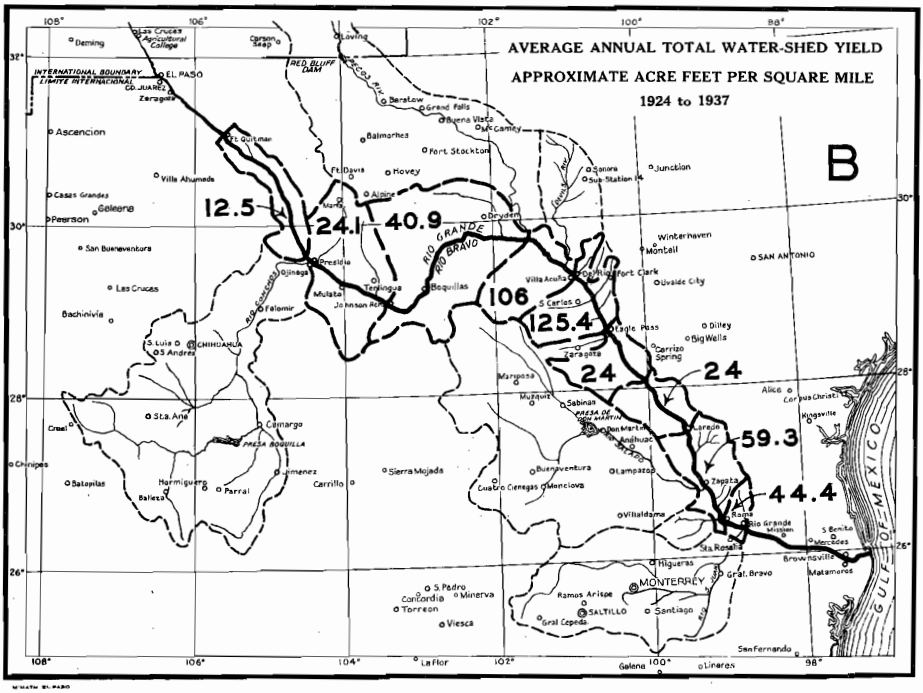
SOURCES OF RIVER FLOW —continued



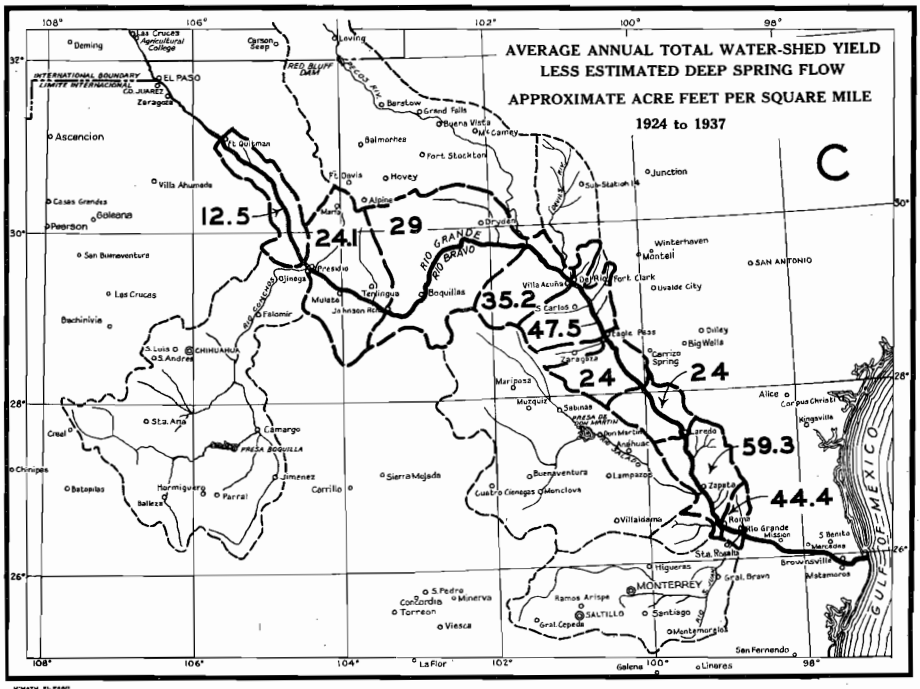


SOURCES OF RIVER FLOW —continued





SOURCES OF RIVER FLOW — continued



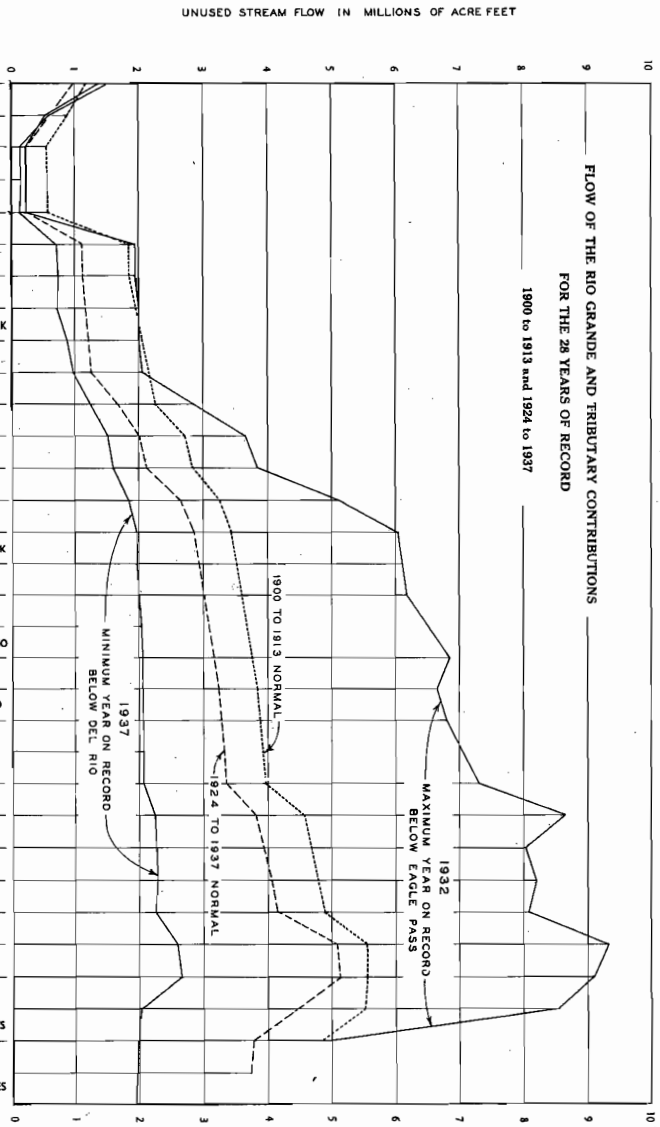
SOURCES OF RIVER FLOW

A distinction must be made clear between the figures in the table at the lower or left side of this page showing average annual unused run-off and the graphical part of the page showing unused stream flow.

As an illustration of this distinction consider the unused stream flow at Upper Presidio. The amounts shown graphically above or to the right of the page are the millions of acre feet of water which actually flowed past this station while the amounts shown by figures below or to the left of the page are acre feet per square mile of unused run-off which includes (a) the water which actually flowed past the station and from which has been subtracted (b) the water which ran off the water-shed into Elephant Butte reservoir in years prior to 1924 and was drawn from the reservoir during the period 1924 to 1937 and to which has been added (c) the water which has been compounded since 1924 and remained in El Vado reservoir at the close of the year 1937. This subtractive carry-over storage in Elephant Butte reservoir averaged 15,700 acre feet per year. The additive carry-over storage in El Vado reservoir averaged 2,100 acre feet per year.

Other carry-over storage figures are: Boquillas reservoir on the Rio Conchos, 46,100 acre feet per year, subtractive. Alamogordo, McMillan, Avalon and Red Bluff reservoirs all on the Pecos river, 17,800 acre feet per year, additive. Centenario and San Miguel reservoirs on the Rio San Diego, 300 acre feet per year, additive. Don Martin reservoir on the Rio Salado, 500 acre feet per year, additive. At Rio Grande City, 29,400 acre feet per year, additive which is due to the fact that during the 1932 flood 411,000 acre feet of water from the Rio San Juan entered the Rio Grande below the Rio Grande City gaging station and hence was not measured as passing that station.

AVERAGE ANNUAL UNUSED RUN-OFF A.F. / SQ. MI.		
1900-1913	1924-1937	
46.8*	38.6*	SAN MARCIAL
		UNMEASURED
29.7*	19.5*	EL PASO
		UNMEASURED
†17.7*	6.6*	FORT QUITMAN
		UNMEASURED
11.1†	6.3	LA NUTRIA
		UNMEASURED
17.1*	6.6*	UPPER PRESIDIO
55.8	36.4	RIO CONCHOS
		UNMEASURED
		LOWER PRESIDIO
		ALAMITO CREEK
24.4	32.2	TERLINGUA CREEK
		UNMEASURED
		JOHNSON RANCH
		UNMEASURED
30.7*	21.7*	LANGTRY
11.4	9.5	PECOS RIVER
115 000†	115 000	GOODENOUGH SPRING
106	124	DEVILS RIVER
54.3	70.6	UNMEASURED
28.6*	23.8*	DEL RIO
		SAN FELIPE CREEK
		PINTO CREEK
96.5	94.3	RIO SAN DIEGO
		RIO SAN RODRIGO
		UNMEASURED
31.0*	25.8*	EAGLE PASS
		RIO ESCONDIDO
26.7	23.5	UNMEASURED
		EL JARDIN (Estimated)
		UNMEASURED
30.8*	25.7*	LAREDO
26.8	20.5	RIO SALADO
		UNMEASURED
		ZAPATA
58.5	61.3	RIO ALAMO
		UNMEASURED
31.2*	26.1*	ROMA
48.8	73.7	RIO SAN JUAN
44.4†	44.4	UNMEASURED
32.6*	29.9*	RIO GRANDE CITY
		DIVERSIONS
		OVERFLOW AND CHANNEL LOSSES
		MATAMOROS
		DIVERSIONS
		OVERFLOW AND CHANNEL LOSSES
		LOWER BROWNSVILLE

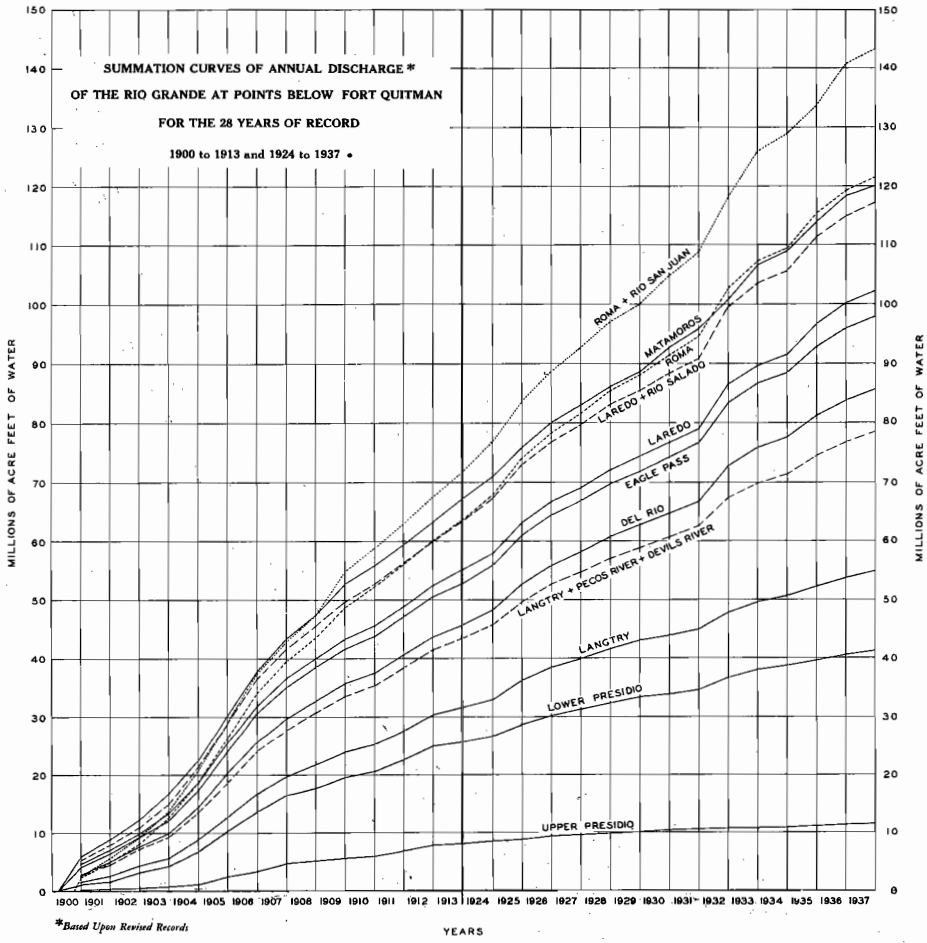


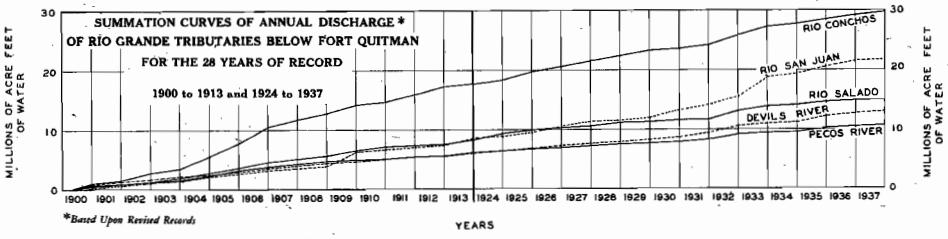
†ESTIMATED

*UNUSED RUN-OFF AT AND ABOVE GAGING STATION

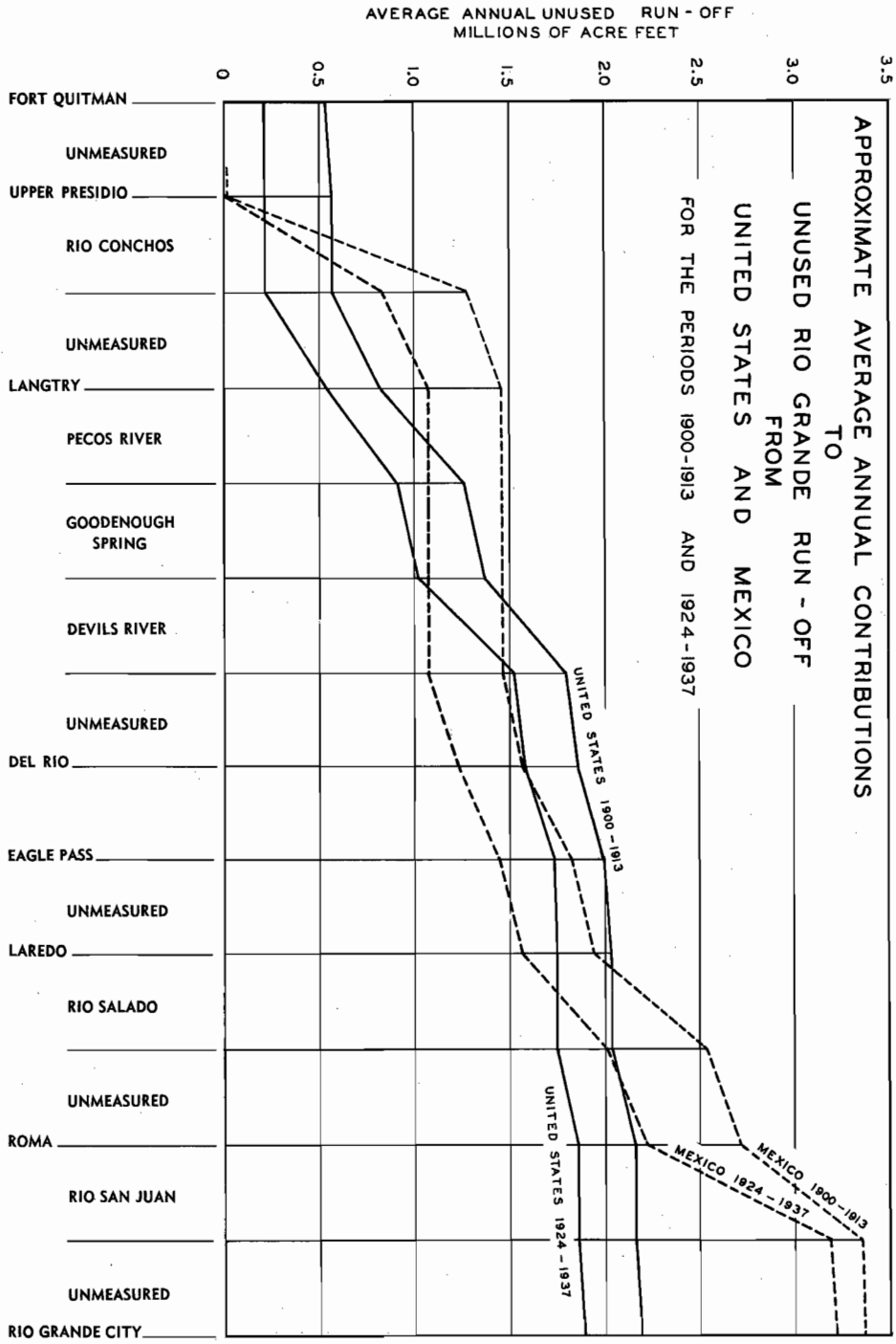
UNUSED STREAM FLOW IN MILLIONS OF ACRE FEET

SOURCES OF RIVER FLOW





SOURCES OF RIVER FLOW



SILT SAMPLING OF WATER FROM RIO GRANDE AND TRIBUTARIES, 1937

Gravimetric Percentages of Dried Silt in the Rio Grande at San Marcial, New Mexico as Determined from Water Samples During 1937

The gravimetric percentages of dry silt reported here were determined from water samples taken by the United States Section of the International Boundary Commission in small necked bottles by lowering the open bottle into the water at one or more verticals in the stream cross section, being careful to approach but not to strike bottom. The percentages of silt were determined by the United States Department of Agriculture at Riverside, California, prior to September 1937. Afterward the silt determinations were made at El Paso by the United States Section of the Commission by determining the silt in a single monthly composite sample which was composed by using from each daily sample an amount proportional to the river flow at the time the sample was taken.

For visualization and comparison, the assumption is indulged here that 1,452 tons of silt would occupy one acre foot in a reservoir bottom, which is equivalent to saying that one cubic foot of silt thus situated would weigh 66.7 pounds. On a later page in this bulletin there is given some data showing the average density of Rio Grande silt.

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		.60	1.66	.48		.23	.38	1.41	Daily samples composited for each of these months.			
2		.33	1.29	.83	.13	.44	.70	1.21				
3		.24	.83	.44	1.29	.38	.38	1.51				
4	.54	.21	1.26	.54	1.23	.53	1.60	2.13				
5		.27	1.73	1.12	1.25	.39	1.79	1.07				
6		.20	.92	.64	.53		.96	.39				
7	.41		.72	.66	.55	.12	.62	2.23				
8		.25	.81	.51	1.41	.16	.38	.11				
9		.35	.72	.48	.18	.15	.23	.25				
10		4.06	1.31	.56	.49	.12	.43	.74				
11		.64	.77		.46	.13	.31	.36				
12		.45	1.11	.77	.70	.23		.14				
13		.47	.82	1.70	.28		1.87	.07				
14	.24	.34	1.26	1.37	.17	.03	1.11	.07				
15		.27	1.00	.86	.15	.05	.73					
16		.60	1.22	.91	1.35	.09	.67					
17		2.17	1.04		3.58	.08	.32					
18		2.33	.92	.74	5.52	.07	.89					
19		1.89	.85	.73	.18	.07	.17					
20		1.45	1.21	1.85	.18	.03	.12					
21	.32	1.19	1.02	2.20	.12	.06	.10	.88				
22		1.00	.69	2.15	.16	.04	.06					
23		.69	.43	1.39		.05	.05	.59				
24		.69	.51	.01		.03	.05	.46				
25		.56	1.00	.66	.05	.02	.02	.48				
26		.48	.95			.05	.07	.31				
27		.72	.59	1.10	.34	2.27	.07	.25				
28	.32	.88	.56	.84	.11	1.48	.06	.95				
29			.43	.81		1.02	.14	.65				
30			.72	.02	.06	.63	2.62	1.52				
31			.44				2.07	.60				

Tons of Suspended Silt Passing San Marcial in the Rio Grande During 1937

Months	Tons of Water	SUSPENDED SILT		
		Tons	Average Percent By Weight	Acre Feet at 1,452 Tons Per Acre Foot
January	48,930,000	182,300	.373	125.6
February	96,550,000	1,139,200	1.180	784.6
March	154,040,000	1,468,800	.954	1,012
April	354,350,000	3,512,700	.991	2,419
May	794,280,000	4,918,200	.619	3,387
June	346,230,000	1,464,600	.423	1,009
July	113,960,000	1,057,300	.928	728.2
August	31,660,000	299,500	.946	206.3
September	49,290,000	397,800	.807	274.0
October	57,160,000	588,800	1.03	405.5
November	24,020,000	20,400	.085	14.0
December	50,590,000	44,000	.087	30.3
The Year	2,121,060,000	15,093,600	.712	10,395.5

SILT SAMPLING OF WATER FROM RIO GRANDE AND TRIBUTARIES, 1937 —continued

Gravimetric Percentages of Dried Silt in the Rio Grande at Eagle Pass, Texas as Determined from Water Samples During 1937

The gravimetric percentage of dry silt reported here were determined by the United States Department of Agriculture at Austin, Texas, from samples of Rio Grande water taken approximately every second day prior to May 11, and daily thereafter by the Mexican Section of the International Boundary Commission. The samples were taken in small necked bottles at three points at the surface of the stream, viz: at the mid-point, and at each side, one sixth of the width from the edge of the stream. Numerous experiments have shown that the mean of three samples so taken gives 0.909 of the mean suspended silt in the stream within reasonable limits of accuracy.

The daily figures below were computed in accordance with the foregoing.

For visualization and comparison, the assumption is indulged here that 1,452 tons of silt would occupy one acre foot in a reservoir bottom, which is equivalent to saying that one cubic foot of silt thus situated would weigh 66.7 pounds. On a later page in this bulletin there is given some data showing the average density of Rio Grande silt in Elephant Butte reservoir.

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.0004	.0261	.0487	.0108	.0055	.3069	.0129	.0960	.2995	.7076	.0891	.0234
2	.0008	.0130	.0346	.0036	.0080	2.5516	.0195	.0789	.3121	.6776	.0888	.0099
3	.0008	.0000	.0206	.0044	.0077	2.4291	.0146	.0352	.3655	.4650	.0965	.0154
4	.0008	.0011	.0121	.0052	.0074	2.6078	.0344	.0608	.3300	.4614	.0913	.0014
5	.0010	.0022	.0088	.0170	.0074	2.3416	.0256	.0415	.0657	.3567	.0217	.0014
6	.0011	.0029	.0066	.0289	.0074	1.4322	.0231	.0044	.0679	.3341	.1752	.0014
7	.0006	.0036	.0044	.0272	.0074	.9185	.0129	.0044	.0756	.1471	.1760	.0121
8	.0000	.0029	.0033	.0256	.0074	.9155	.0124	.0036	.0718	.1598	.1785	.0184
9	.0000	.0022	.0022	.0544	.0104	.8635	.0124	.0044	.0693	.1210	.1045	.0132
10	.0000	.0274	.0059	.0833	.0135	.7161	.0085	.0058	.0454	.0880	.0792	.0124
11	.0000	.0525	.0096	.0600	.0082	.5280	.0190	.0014	.0484	.0679	.0770	.0077
12	.0000	.0332	.0070	.0366	.0030	.5316	.0176	.0058	3.0646	.0759	.1045	.0036
13	.0000	.0138	.0044	.0304	.0036	.3124	.0179	.0096	3.1980	.0715	.4436	.0052
14	.0000	.0158	.0044	.0242	.0080	.2632	.0289	.0000	3.1776	.4403	.5739	.0099
15	.0000	.0179	.0044	.0134	.0074	.1433	.0239	.0000	3.2238	.4524	.6267	.0124
16	.0000	.0090	.0099	.0022	.0184	.1444	.0932	.0000	2.0699	1.4919	.3699	.0261
17	.0000	.0000	.0154	.0011	.0165	.1477	.0850	.0022	2.1084	1.4825	.0490	.0253
18	.0000	.0011	.0134	.0000	.0190	.0638	.0850	.0344	1.3076	1.4798	.1419	.0190
19	.0022	.0022	.0113	.0014	.0148	.0572	.0855	.0355	.5651	.9977	.5294	.0157
20	.0044	.0070	.0074	.0022	.0168	.0641	.0935	.0407	.5709	.9793	.2615	.0220
21	.0022	.0118	.0036	.0022	.0184	.0866	.3883	.0451	.5574	.2335	.7884	.0187
22	.0000	.0110	.0530	.0022	.0096	.0899	.2860	.0426	.3905	.2566	.1350	.0242
23	.0000	.0102	.1023	.0011	.0096	.0877	.1287	.0437	.4037	.2538	.0297	.1012
24	.0000	.0094	.1019	.0000	.0052	.0806	.1452	.0459	.3993	.1188	.0275	.0976
25	.0086	.0085	.1015	.0000	.0140	.0825	.1309	.0902	.3715	.1130	.0308	.0998
26	.0173	.0064	.0552	.0000	.0140	.0814	.1449	.8577	4.2892	.1207	.0289	.1020
27	.0126	.0044	.0088	.0022	.0088	.1136	.0855	1.9209	4.3898	.0591	.0289	.1026
28	.0085	.0266	.0098	.0044	.0877	.1147	.0850	1.8458	3.3916	.0602	.0272	.1026
29	.0063		.0107	.0037	.0836	.0558	.1020	1.9148	1.6910	.0649	.0231	.1023
30	.0041		.0143	.0030	.0789	.0531	.0894	1.9492	.7175	.0861	.0245	.0905
31	.0110		.0179		.0850		.0877	1.8293		.0987		.2288

Tons of Suspended Silt Passing Eagle Pass in the Rio Grande During 1937

Months	Tons of Water	SUSPENDED SILT		
		Tons	Average Percent By Weight	Acre Feet at 1,452 Tons Per Acre Foot
January	215,210,000	5,700	.0026	3.9
February	183,080,000	21,200	.0116	14.6
March	184,810,000	40,300	.0218	27.8
April	135,590,000	19,500	.0144	13.4
May	159,420,000	48,500	.0304	33.4
June	373,600,000	3,803,400	1.0180	2,619.4
July	170,930,000	138,200	.0808	95.2
August	184,650,000	1,220,500	.6610	840.6
September	355,470,000	6,686,000	.1881	4,604.7
October	386,860,000	2,140,500	.5533	1,474.2
November	190,000,000	297,500	.1566	204.9
December	226,720,000	122,100	.0538	84.1
The Year	2,766,340,000	14,543,400	.5257	10,016.2

SILT SAMPLING OF WATER FROM RIO GRANDE AND TRIBUTARIES, 1937—continued

Gravimetric Percentages of Dried Silt in the Rio Alamo at Mier, Tamaulipas, and in the Rio San Juan at Santa Rosalia, Tamaulipas, Mexico, as Determined from Water Samples During 1937

The gravimetric percentages of dry silt reported here for two Mexican tributaries to the Rio Grande were determined by the Mexican Section of the International Boundary Commission from samples taken by that section. The samples were taken in small necked bottles at three points at the surface of the stream, viz: at the mid-point, and at each side, one sixth of the width from the edge of the stream. Numerous experiments have shown that the mean of three samples so taken gives 0.908 of the mean suspended silt in the stream within reasonable limits of accuracy. The computations below were made in accordance with the foregoing.

It is impossible to foretell the density with which this silt would settle into the bottom of a reservoir; but merely for visualization and comparison, the assumption is indulged here that 1,452 tons of silt would occupy one acre foot in a reservoir bottom, which is equivalent to saying that one cubic foot of silt thus situated would weigh 66.7 pounds.

Silt in Rio Alamo – 1937

Date	% Silt	Date	% Silt	Date	% Silt
March 20	0.55080	July 5	0.19928	October 11	1.07601
May 7	0.08511	July 10	1.04962	October 11	1.48668
May 14	0.44778	August 17	1.30579	November 3	1.12632
		September 26	1.48448		

Tons of Suspended Silt Passing Cd. Mier in the Rio Alamo—1937

Months	Tons of Water	SUSPENDED SILT		
		Tons	Average Percent By Weight	Acre Feet at 1,452 Tons Per Acre Foot
January	1,484,000	8 0	8 0	8 0
February	692,000	8 0	8 0	8 0
March	3,178,000	6,260	.1970	4.3
April	717,000	0	0	0
May	4,454,000	19,100	.4293	13.2
June	603,000	8 0	8 0	8 0
July	3,976,000	23,500	.5900	16.2
August	6,164,000	43,800	.7103	30.2
September	5,184,000	55,900	1.0779	38.5
October	10,816,000	89,300	.8257	61.5
November	1,779,000	7,530	.4234	5.2
December	1,354,000	8 0	8 0	8 0
The Year	40,401,000	245,390	.6074	169.1

Silt in Rio San Juan – 1937

Date	% Silt	Date	% Silt	Date	% Silt	Date	% Silt	Date	% Silt
Jan. 1	0.02014	June 2	Trace	July 26	Trace	Oct. 18	0.09983	Dec. 6	0.02683
Feb. 1	Trace	June 7	Trace	Aug. 2	Trace	Oct. 25	0.1071	Dec. 13	Trace
Mar. 1	Trace	June 14	0.01175	Aug. 30	0.04808	Nov. 1	Trace	Dec. 20	Trace
Mar. 31	Trace	June 21	Trace	Sept. 13	Trace	Nov. 8	0.18827		
May 17	0.06863	July 10	0.6804	Sept. 26	0.8707	Nov. 15	Trace		
May 24	Trace	July 19	0.38645	Oct. 11	2.4236	Nov. 22	Trace		

Tons of Suspended Silt Passing Santa Rosalia in Rio San Juan – 1937

Months	Tons of Water	SUSPENDED SILT		
		Tons	Average Percent By Weight	Acre Feet at 1,452 Tons Per Acre Foot
January	51,191,000	3,940	.0077	2.7
February	36,105,000	0	0	0
March	32,584,000	0	0	0
April	13,071,000	8 0	8 0	8 0
May	14,016,000	2,270	.0162	1.6
June	13,837,000	28,500	.2059	19.6
July	61,216,000	288,600	.4715	198.8
August	33,863,000	779	.0023	.54
September	47,725,000	155,400	.3256	107.0
October	95,516,000	427,500	.4476	294.4
November	7,961,000	11,900	.1501	8.2
December	38,586,000	4,440	.0115	3.1
The Year	445,671,000	923,329	.2072	635.94

8 Estimated

SILT SAMPLING OF WATER FROM RIO GRANDE AND TRIBUTARIES, 1937 —continued

Gravimetric Percentages of Dried Silt in the Rio Grande at Roma, Texas as Determined from Water Samples During 1937

The gravimetric percentages of dry silt reported here were determined by the United States Department of Agriculture at Austin, Texas, from samples of Rio Grande water taken every day by the United States Section of the International Boundary Commission. The samples were taken in small necked bottles at three points at the surface of the stream, viz: at the mid-point, and at each side, one sixth of the width from the edge of the stream. Numerous experiments have shown that the mean of three samples so taken gives 0.908 of the mean suspended silt in the stream within reasonable limits of accuracy.

The daily figures below were computed in accordance with the foregoing.

For visualization and comparison, the assumption is indulged here that 1,452 tons of silt would occupy one acre foot in a reservoir bottom, which is equivalent to saying that one cubic foot of silt thus situated would weigh 66.7 pounds. On a later page in this bulletin there is given some data showing the average density of Rio Grande silt in Elephant Butte reservoir.

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.0000	.0014	.0014	.0008	.1144	.2024	.0382	.0080	.3110	.9391	.0844	.0194
2	.0000	.0000	.0000	.0000	.0572	.3473	.0319	.0036	.3649	1.4036	.0663	.0223
3	.0000	.0011	.0008	.0000	.0308	.4227	.0308	.0036	.8514	1.4259	.0773	.0289
4	.0000	.0014	.0008	.0000	.0187	.4356	.0107	.0030	.4859	1.1646	.0355	.0234
5	.0000	.0008	.0008	.0030	.0209	.1738	.0187	.0022	.4271	.8104	.0308	.0234
6	.0008	.0022	.0022	.0000	.0148	.1317	.0135	.0036	.7216	.6314	.0594	.1471
7	.0022	.0008	.0000	.0030	.0525	1.2609	.1323	.0036	.9996	.5170	.0586	.1546
8	.0022	.0022	.0000	.0008	.0883	1.7680	.0146	.0036	.6674	.4128	.0674	.0822
9	.0000	.0008	.0000	.0014	.1370	1.7006	.0124	.0036	.2280	.3998	.0377	.0682
10	.0000	.0000	.0000	.0000	.0385	1.7575	.2890	.0044	.1147	.3707	.0531	.0366
11	.0000	.0000	.0000	.0000	.0198	1.5389	.0245	.0052	.0789	.8005	.0426	.0245
12	.0000	.0008	.0008	.0000	.0135	1.3156	.0671	.0022	.0586	.3721	.0473	.0154
13	.0000	.0000	.0014	.0022	.1295	.8847	.0580	.0014	.0330	.1914	.0305	.0143
14	.0000	.0000	.0077	.0000	.3231	.6289	.0311	.0000	.0597	.1169	.0283	.0044
15	.0000	.0022	.0008	.0000	.0990	.5173	.0121	.0000	.0558	.0924	.0319	.0055
16	.0000	.0008	.0000	.0007	.1609	.3561	.0135	.2340	.0366	.0674	.0190	.0077
17	.0000	.0000	.0030	.0014	.0162	.2486	.0165	1.6288	.6600	.1207	.0470	.0088
18	.0000	.0000	.0000	.0044	.0143	.1859	.0140	.5236	.8088	.2530	.0377	.0033
19	.0014	.0008	.0014	.0022	.0110	.1141	.0014	.1323	1.0230	.3006	.0330	.0033
20	.0000	.0000	.2423	.0000	.0135	.0998	.0030	.0289	1.4542	.3836	.0388	.0044
21	.0000	.0000	.0308	.0000	.0088	.0800	.0030	.0080	1.8579	.6864	.0363	.0044
22	.0000	.0000	.0113	.0000	.0077	.0561	.0030	.0030	1.6409	.4062	.0393	.0044
23	.0000	.0000	.0030	.0008	.0074	.0630	.0014	.0022	2.2250	.4829	.0396	.0058
24	.0000	.0000	.0000	.0014	.0066	.0484	.0063	.0030	1.7325	.3870	.0476	.0146
25	.0000	.0008	.0008	.0000	.0036	.0685	.0014	.0036	1.1707	.9705	.0495	.0128
26	.0000	.0000	.0014	.0008	.0074	.0542	.0030	.0190	1.1366	.6424	.0572	.0107
27	.0008	.0000	.0000	.0000	.0000	.0481	.0014	.0250	.6427	.6614	.0459	.0129
28	.0008	.0000	.0000	.0000	.0008	.0322	.0022	.0682	.5536	.5503	.0319	.0132
29	.0000		.0008	.0000	.0030	.0198	.0036	.0484	.7378	.4249	.0258	.0198
30	.0000		.0000	.0000	.0121	.0107	.0030	.0630	.9515	.2808	.0264	.0792
31	.0000		.0000		.0030		.0044	.2310		.1279		.2417

Tons of Suspended Silt Passing Roma in the Rio Grande During 1937

Months	Tons of Water	SUSPENDED SILT		
		Tons	Average Percent By Weight	Acre Feet at 1,452 Tons Per Acre Foot
January	238,600,000	600	.0003	.4
February	200,690,000	1,200	.0006	.8
March	211,150,000	24,900	.0118	17.2
April	141,210,000	1,100	.0007	.7
May	181,110,000	128,700	.0711	88.6
June	491,160,000	3,408,400	.6940	2,347.4
July	196,210,000	58,900	.0300	40.6
August	220,780,000	788,400	.3571	543.0
September	295,470,000	2,510,000	.8495	1,728.7
October	468,150,000	2,998,900	.6406	2,065.3
November	188,620,000	84,900	.0450	58.5
December	223,400,000	102,300	.0458	70.4
The Year	3,056,550,000	10,108,300	.3307	6,961.6

GENERALIZED RIO GRANDE SILT DATA

Elephant Butte Reservoir

Storage of water began in Elephant Butte reservoir in January, 1915. At the times indicated in the following table, the volume of silt, accumulated in the reservoir below spillway level, was determined by field surveys reported by the United States Bureau of Reclamation. By sampling the Rio Grande from 1925 to 1935 for suspended silt at San Marcial, the number of tons of suspended silt entering the reservoir via the river were determined for this period. In the table below no account is taken of silt accumulated in the reservoir above spillway level and silt sampling during the last period did not include silt transported as bed load in the river nor silt entering the reservoir at side arroyos. Neglecting, as small or counteracting, the three factors mentioned in the preceding sentence, as well as change (if any) in the density of old silt which might have occurred during the last period, it may be said that the average cubic foot of silt deposited in the reservoir during the last nine and two-third year period weighed 70.2 pounds when measured at the end of the period.

This calculation of weight per cubic foot tends to confirm the figure 66.7 pounds per cubic foot used elsewhere in these Water Bulletins as well as the figure 70 pounds per cubic foot reported in Tech. Bul. No. 382 U.S. Dept. Agr. The important thing to note here is that over a period of nine and two-third years in Elephant Butte reservoir the number of cubic feet of silt found below spillway level when multiplied by 70.2 equaled the number of pounds of dry silt found by sampling the river flow entering the reservoir.

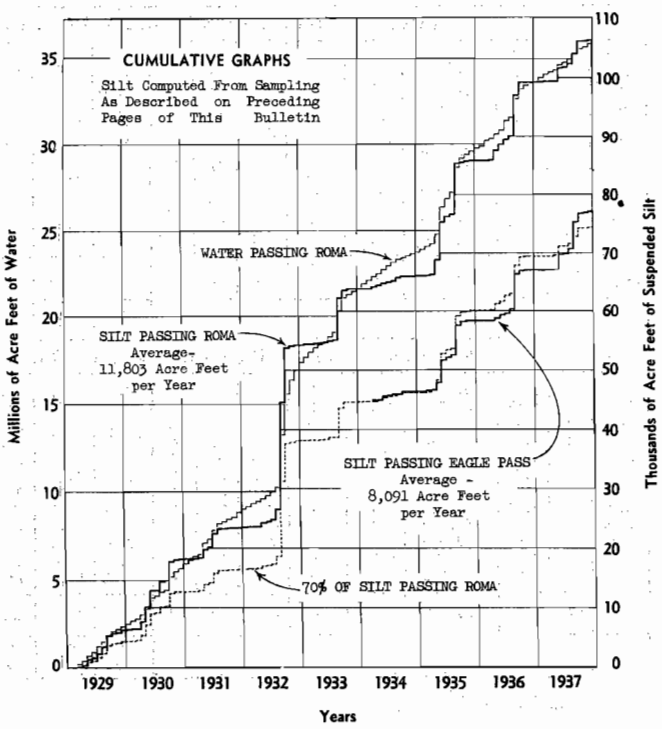
Period	Acre Feet		Volumetric Ratio Silt to Water	Tons of Dry Silt Passing San Marcial By Sampling	Gravimetric Ratio Tons Per Acre Foot of Silt
	Silt In Reservoir By Field Survey	Water Passing San Marcial			
Up to Dec. 1, 1916	53,995	2,954,000	.0183		
Dec. 1, 1916 to Sept. 1, 1920	86,015	5,211,000	.0165		
Sept. 1, 1920 to Sept. 1, 1925*	109,472	5,632,000	.0194		
Sept. 1, 1925* to May 1, 1935**	122,075	8,305,000	.0147	186,506,000	1,528
Total up to May 1, 1935**	371,557	22,102,000	.0168		
Average per Year	18,276	1,087,162	.0168 = 1.68%	19,287,073	

* Errors in original 1925 survey due to wrong elevations of bench marks and an error in planimetering the 4450 contour area are corrected in the figures shown above.

** Curvilinear interpolations of areas for each foot were used here between 10 foot elevation increments and volume increments were computed for each foot of elevation by the average end area formula.

Lower Rio Grande

These cumulative graphs show the relationship between the rate of flow of water and suspended silt at the Roma gaging station, also the variations in this relationship for nine years, or since silt sampling began at Roma in 1929. The relationship between the rate of flow of suspended silt at Roma and Eagle Pass is also shown. From the graphs it is seen that the amount of suspended silt at Eagle Pass approximates 70% of that at Roma. It is also seen that at Roma the volumetric ratio of silt to water averaged about 30,000 acre feet of silt to 10,000,000 acre feet of water which is about .0033 or .33%. This is about one fifth of the percentage in the water entering Elephant Butte reservoir.



CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE AND TRIBUTARIES — 1937

The chemical analyses reported here were made by the United States Department of Agriculture at Riverside, California, from water samples taken by the United States Section of the International Boundary Commission.

For the stations at San Marcial, El Paso, Fort Quitman, Upper Presidio, Rio Grande City, and Lower Brownsville, the monthly figures in the tables show the results of compositing, by using from each of the samples amounts proportional to the volume of river flow represented by each sample.

To convert "Milligram Equivalents" to parts per million by weight, multiply each ion by its appropriate conversion factor. These factors are: HCO_3, 61; CL, 35.5; SO_4, 48; Ca, 20; Mg, 12.16; Na, 23; NO_3, 62.

Conductance, reported in the tables as ($K \times 10^5$ at 25° C), is a relative measure of the total salt concentration in the water samples. (See Circular No. 232 U. S. Dept. Agr., July, 1932.) It is a definite statement of an important physical property of the solution.

Month	No. of Samples	Tons of Salts Per Acre Foot	Tons of Salts Per Month	Mean $K \times 10^5$ @25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter: Ca	Mg	Na	$CO_3 + HCO_3$	SO_4	Cl	NO_3
Water Samples from Rio Grande at San Marcial Station															
Jan.	5	.81	29,080	91.8	8 .16	8.0	53	28	2.79	1.13	4.41	2.02	4.11	2.32	tr
Feb.	27	.75	53,180	88.0	.10	7.6	47	20	3.66	1.08	4.22	2.77	4.63	1.84	.03
Mar.	31	.63	71,190	73.2	.13	7.5	40	17	3.39	1.30	3.10	2.83	3.58	1.25	.07
Apr.	27	.49	127,400	55.7	.11	8.9	40	17	2.32	0.77	2.09	2.14	2.36	0.87	.02
May	26	.45	262,800	50.7	.12	8.2	41	19	2.30	0.67	2.08	2.26	1.84	0.92	.03
June	28	.60	152,400	63.7	.12	7.9	40	17	2.92	1.01	2.58	2.12	3.14	1.01	.05
July	30	.79	66,120	84.5	.17	8.1	43	16	3.75	1.11	3.74	2.37	4.83	1.35	.03
Aug.	24	.97	22,600	101	.17	8.3	45	17	4.44	1.47	4.88	2.72	6.09	1.70	.05
Sept.	30	.81	29,320	86.1	.19	8.0	44	18	3.73	1.26	3.95	2.67	4.58	1.50	.05
Oct.	31	.96	40,320	102	.16	7.8	44	17	4.32	1.47	4.63	2.83	5.92	1.80	.01
Nov.	30	.95	16,720	105	.20	7.9	47	22	4.17	1.46	5.01	3.28	4.82	2.35	tr
Dec.	31	.89	33,110	98.9	.15	8.2	47	23	3.97	1.44	4.79	3.33	4.30	2.30	.01
Total &*Mean	320	.58	904,240	64.5	.13	8.2	42	18	2.82	0.92	2.73	2.35	2.93	1.15	.03
									** 44	** 14	** 42	*** 37	*** 45	*** 18	
Water Samples from Rio Grande at El Paso Station															
Jan.	4	1.97	16,820	217	.36	8.3	60	40	6.32	2.30	13.18	4.63	8.91	8.91	.02
Feb.	4	1.64	16,730	198	.21	7.9	63	40	4.85	2.23	12.19	3.39	8.17	7.62	.03
Mar.	5	1.16	30,390	131	-	8.1	55	31	4.70	1.42	7.42	3.50	5.97	4.15	.07
Apr.	3	1.08	65,230	123	-	8.1	51	30	4.61	1.66	6.55	3.39	5.34	3.74	.04
May	4	1.12	77,840	125	.19	8.2	48	29	4.73	2.36	6.58	3.45	5.93	3.90	.02
June	5	1.06	77,700	116	-	8.2	52	29	4.11	1.44	6.06	3.03	5.27	3.33	.03
July	4	1.06	80,880	117	.21	8.2	51	28	4.38	1.46	6.02	3.38	5.40	3.38	.01
Aug.	5	1.00	88,500	109	.18	8.2	49	27	4.17	1.49	5.40	3.18	4.95	3.01	.02
Sept.	17	0.98	66,840	107	.18	8.2	51	30	3.98	1.42	5.63	3.08	4.67	3.26	.02
Oct.	31	1.66	32,870	182	.31	8.0	57	38	5.88	2.18	10.65	4.34	6.91	6.91	.01
Nov.	30	1.56	26,680	175	.22	7.9	56	35	5.72	2.11	9.77	4.19	7.16	6.16	tr
Dec.	30	1.51	27,480	169	.21	8.3	55	35	5.78	2.15	9.62	4.19	6.97	6.11	.01
Total &*Mean	142	1.13	607,960	126	-	8.2	52	30	4.53	1.69	6.72	3.39	5.58	3.92	.02
									** 35	** 13	** 52	*** 26	*** 43	*** 30	
Water Samples from Rio Grande at Fort Quitman Station															
Jan.	4	3.06	30,140	372	.34	8.1	63	62	7.91	5.27	22.83	2.26	11.39	22.31	.02
Feb.	4	3.37	22,070	403	.34	7.5	64	63	9.04	4.81	24.72	2.32	12.12	24.55	.04
Mar.	4	4.45	19,090	451	.44	7.9	60	63	12.36	5.90	27.53	4.18	12.95	29.06	.04
Apr.	5	4.31	22,840	491	.39	7.8	63	66	12.81	5.88	31.82	3.22	14.09	33.56	.10
May	4	2.96	35,820	340	-	8.4	61	60	9.59	3.90	20.94	3.56	10.14	20.64	.04
June	4	2.92	56,940	324	-	8.2	60	57	9.37	3.81	19.41	3.79	10.23	18.74	.01
July	5	3.22	34,450	366	-	8.3	61	62	10.28	4.05	22.78	3.54	10.57	22.56	.01
Aug.	3	2.63	32,350	293	-	8.3	59	57	8.62	3.87	17.90	3.54	9.19	16.63	.02
Sept.	5	2.48	84,070	282	.33	8.2	59	57	8.38	3.46	17.13	3.53	8.70	16.13	.02
Oct.	11	2.67	68,080	301	.30	7.9	60	57	8.88	3.43	18.68	3.79	9.50	17.33	.02
Nov.	9	2.97	52,270	341	.31	8.2	61	57	9.42	3.80	20.72	3.78	10.68	18.94	tr
Dec.	9	2.69	55,680	303	.30	8.3	60	54	9.05	3.52	18.56	4.25	9.84	16.63	.01
Total &*Mean	67	2.88	513,800	327	-	8.1	60	58	9.18	3.91	20.05	3.60	10.09	19.13	.02
									** 28	** 12	** 60	*** 11	*** 31	*** 58	

8 Composite of 4 samples
** Percent of total cations

* Weighted mean
*** Percent of total anions

CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE AND TRIBUTARIES — 1937 — continued

Month	No. of Samples	Tons of Salts: Per Acre Foot	Tons of Salts: Per Month	Mean $K \times 10^5$ @25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter: Ca	Mg	Na	HCO_3	SO_4	Cl	NO_3
Water Samples from Rio Grande at Upper Presidio Station															
Jan.	2	3.65	30,400	413	-	8.0	61	61	10.98	5.35	25.84	∅ 3.34	12.92	25.50	.02
Feb.	4	3.74	18,920	426	.44	7.3	62	60	11.57	5.02	27.42	3.45	13.82	26.39	.04
Mar.	5	4.07	7,450	456	-	8.2	59	61	13.55	5.75	27.46	3.28	14.90	28.70	tr
Apr.	4	3.65	1,120	407	-	8.3	59	61	12.51	4.22	24.30	∅ 2.60	13.44	25.14	.18
May	4	4.41	580	466	.46	7.7	53	63	16.81	6.44	26.11	2.94	15.39	30.66	.14
June	4	1.87	25,810	213	-	8.3	60	49	6.35	2.31	12.97	∅ 3.34	7.53	10.58	tr
July	6	1.42	10,370	166	-	8.2	56	52	5.43	1.89	9.26	∅ 2.57	5.27	8.50	.01
Aug.	2	0.58	5,680	64.6	-	8.3	44	20	2.96	1.06	3.13	∅ 3.38	2.36	1.35	.06
Sept.	6	1.09	42,070	127	.20	7.9	57	42	4.15	1.29	7.17	∅ 2.32	4.75	5.16	.04
Oct. Nov. Dec.	†8	2.47	167,220	283	.27	8.0	60	55	8.25	3.22	17.14	∅ 3.33	9.19	15.58	.01
Total* & Mean	44	2.03	309,620	232	-	8.0	58	49	6.91	2.66	13.93	3.04	7.73	12.33	.02
									** 29	** 11	** 60	*** 13	*** 34	*** 53	
Water Samples from Rio Grande at Rio Grande City Station															
Jan.	3	1.20	265,200	137	.20	7.7	47	39	4.82	2.55	6.52	2.99	5.64	5.46	.02
Feb.	4	1.30	231,400	145	.20	7.8	48	37	4.96	2.60	7.09	2.88	6.14	5.87	.01
Mar.	5	1.23	223,860	141	.28	7.9	48	40	4.50	2.64	6.68	2.37	6.17	5.57	.02
Apr.	3	1.40	165,200	163	-	7.8	51	45	4.72	3.13	8.27	∅ 2.32	6.43	7.16	.03
May	6	1.17 ð	ð 179,010	129 ð	-	7.9	47	39	4.16	2.05	5.55	2.26	5.03	4.74	0
June	5	1.03 ð	ð 389,340	113 ð	-	8.1	45	37	4.38	1.75	4.95	∅ 2.47	4.42	3.91	.11
July	4	1.22 ð	ð 265,960	135 ð	-	8.0	36	28	5.50	1.95	4.23	∅ 1.97	6.42	3.28	.04
Aug.	4	1.01 ð	ð 164,630	111 ð	-	8.2	40	31	4.32	1.67	3.96	∅ 2.52	4.42	3.06	.07
Sept.	6	0.83	217,460	95.1	.20	8.2	44	33	4.08	1.28	4.16	∅ 2.82	3.65	3.11	.04
Oct.	5	0.87	347,130	102	.15	7.8	44	32	4.21	1.38	4.40	2.73	3.92	3.06	.01
Nov.	5	1.23	212,790	144	.17	8.0	49	41	4.99	2.33	6.97	∅ 2.42	5.62	5.61	.04
Dec.	3	1.43	281,710	161	.19	7.9	50	43	5.27	2.77	7.97	∅ 2.52	6.46	6.86	.01
Total* & Mean	53	1.11 ð	2,943,690 ð	126 ð	-	7.9	45	36	4.61	2.04	5.60	2.55	5.13	4.50	.04
									** 38	** 17	** 45	*** 21	*** 42	*** 37	
Water Samples from Rio Grande at Lower Brownsville Station															
Jan.	5	1.21	250,470	138	.20	8.2	46	39	4.90	2.59	6.49	∅ 2.99	5.64	5.46	tr
Feb.	5	1.30	206,700	148	.27	8.1	49	41	4.98	2.71	7.31	3.05	6.04	6.17	.02
Mar.	4	1.27	172,720	146	.22	8.0	48	39	4.94	2.79	7.22	2.83	6.45	5.87	tr
Apr.	7	1.35	68,440	154	.24	7.9	49	42	4.97	2.97	7.60	∅ 2.88	6.00	6.36	.02
May	4	1.42	156,200	162	-	7.8	48	40	5.55	2.94	7.99	2.37	7.28	6.52	0
Total* & Mean	25	1.29	854,530	147	-	8.0	48	40	5.04	2.75	7.17	2.86	6.20	5.96	tr
									** 34	** 18	** 48	*** 19	*** 41	*** 40	

∅ Includes carbonate
* Weighted mean
† Composite of 4 samples in Oct., one in Nov., 3 in Dec.
ð These figures differ slightly from analyses by Rubidoux Laboratory due to later adjustment of the composites.

** Percent of total cations
*** Percent of total anions

CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE AND TRIBUTARIES—1937—continued

Date	Flow Second Feet	Total Salts T./A.F.	Mean K×10⁵ @25°c	Boron p.p.m.	pH	Percent ** Na	Percent *** Cl	Mean Milligram Equivalents per Liter Ca	Mg	Na	HCO_3	SO_4	Cl	NO_3
Water Samples from the Rio Grande at La Nutria Station														
Jan. 10	158	3.21	372	0.34	7.8	64	61	8.93	4.31	23.41	2.64	11.72	22.67	.01
Jan. 31	114	3.45	384	0.39	7.3	63	61	9.95	4.77	24.61	3.11	12.43	23.90	.03
Feb. 14	95.9	3.44	404	0.19	7.3	64	63	9.14	4.75	24.65	2.20	12.33	24.60	tr
Feb. 28	102	3.46	394	0.43	7.9	64	62	9.63	4.66	24.95	ϕ 2.74	12.49	24.54	.02
Mar. 14	49.1	4.06	458	0.48	7.9	63	64	11.53	5.68	29.15	ϕ 2.79	13.85	30.21	.02
Mar. 28	47.3	3.88	444	0.44	7.4	62	63	11.43	5.65	28.16	3.22	13.81	28.39	.07
Apr. 11	30.4	3.76	428	0.45	7.9	61	61	11.70	5.79	26.84	3.11	14.04	27.04	.03
Apr. 30	82.8	5.10	557	0.54	7.4	63	67	14.23	6.64	36.25	2.88	16.19	38.01	.57
May 14	128	4.37	489	0.50	7.4	65	66	12.28	5.64	32.84	2.60	15.01	33.56	.03
May 28	69.9	4.41	515	0.57	7.8	65	67	12.32	5.81	33.95	1.53	15.68	34.99	.28
June 15	93.8	3.17	361	0.39	7.6	63	60	9.47	4.05	23.46	2.88	12.10	22.36	.21
June 25	16.2	4.19	473	0.46	7.9	65	64	11.46	5.23	30.38	ϕ 1.75	15.14	30.38	.02
July 26	15.8	3.71	408	0.48	7.8	62	61	11.52	4.25	25.27	2.63	13.22	25.26	.02
Aug. 29	338	2.05	231	0.24	7.9	58	56	7.40	2.34	13.43	ϕ 2.73	7.38	12.68	.04
Sept. *		1.87	212	-	8.2	58	51	6.63	2.26	12.24	ϕ 3.28	7.20	10.67	.03
Oct. Nov. Dec. o		2.96	339	0.39	8.1	61	57	9.35	4.04	21.06	ϕ 3.53	10.95	19.39	.01
Water Samples from Rio Conchos near Ojinaga, Chihuahua														
Jan. 10	780	0.71	79.9	0.14	7.9	40	15	3.49	1.06	3.05	ϕ 2.50	4.25	1.21	.01
Feb. 13	720	0.70	72.8	0.15	7.4	36	13	3.77	1.37	2.83	3.11	3.84	1.00	.01
Mar. 13	664	0.63	69.9	0.16	7.2	36	11	3.52	1.05	2.62	2.84	3.58	0.81	.02
Apr. 10	294	0.99	103	0.20	7.6	46	22	4.43	1.39	4.91	3.05	5.37	2.34	tr
May 15	373	1.14	113	0.17	7.5	34	25	5.66	2.79	4.34	1.70	8.00	3.32	tr
June 12	505	0.48	61.4	0.11	8.0	40	22	2.42	0.72	2.12	2.15	2.00	1.13	.01
July 12	840	0.60	63.3	0.12	8.0	35	13	3.23	0.81	2.17	ϕ 2.32	3.13	0.82	.01
Aug. 15	44.2	1.23	123	0.24	8.0	48	25	5.19	1.48	6.23	ϕ 3.23	6.22	3.11	.01
Sept&Oct†		0.52	53.5	0.12	8.0	32	9	3.16	0.69	1.79	ϕ 2.37	2.51	0.45	.04
Nov&Dec††		0.78	83.6	0.17	8.2	42	14	3.99	0.80	3.45	ϕ 2.82	4.50	1.20	.03
Water Samples from Pecos River Station														
Jan. 14	285	4.66	526	0.26	8.0	62	64	10.46	9.75	33.05	ϕ 2.00	17.17	34.21	.01
Feb. 11	265	4.86	559	0.26	7.4	62	65	11.64	9.55	34.23	2.26	17.47	35.56	.05
Mar. 10	286	4.60	521	0.27	8.2	62	64	11.09	9.62	33.18	ϕ 2.65	16.82	34.36	.04
Apr. 7	227	5.45	605	0.32	8.2	61	64	13.04	11.58	38.83	2.60	20.13	40.44	.07
May 12	278	0.86	103	0.07	8.5	52	55	2.85	1.69	4.94	ϕ 1.13	3.11	5.16	.11
June 15	867	3.20	353	0.25	7.8	58	59	8.60	6.54	20.94	2.43	12.30	21.23	.05
July 16	236	3.59	376	0.13	7.8	55	51	11.64	7.31	22.95	ϕ 2.03	17.18	20.04	.02
Aug. 11	311	3.95	425	0.37	8.1	56	56	11.68	8.08	25.18	ϕ 2.32	17.55	24.83	.02
Sept. 20	340	5.04	530	0.22	8.1	57	57	14.50	10.11	32.63	ϕ 2.22	21.56	32.01	.02
Oct. 14	1,430	4.51	475	0.22	7.8	56	57	13.79	8.41	28.66	2.47	19.25	28.36	.04
Nov. ♂		5.09	543	0.28	7.8	57	57	14.91	9.94	32.65	2.32	21.66	32.16	.02
Water Samples from Rio Salado Station														
Jan. 19	134	3.62	336	1.22	7.8	43	30	13.63	8.25	16.50	ϕ 2.10	24.95	11.03	.36
Feb. 15	146	4.16	398	1.35	7.5	44	31	16.20	9.32	19.79	2.88	28.51	13.60	.36
Mar. 17	146	3.17	306	1.20	7.4	46	31	13.13	6.74	14.98	1.98	21.36	10.76	.43
Apr. 15	93.6	4.63	421	1.59	8.1	44	30	17.77	10.30	21.91	2.20	32.70	14.77	.43
May 18	229	1.66	176	0.53	8.4	41	31	7.52	3.15	7.55	ϕ 1.13	11.57	5.40	.29
July 15	982	3.64	337	1.31	7.9	45	31	12.87	7.76	17.22	1.01	25.20	11.54	.03
Aug. 19	218	0.38	44.9	0.10	8.4	33	21	2.28	0.54	1.39	ϕ 1.51	1.87	0.87	.01
Sept. 15	409	0.51	57.6	0.16	7.9	31	21	3.36	0.93	1.94	ϕ 1.92	2.57	1.20	.01
Oct. 27	56.8	2.49	240	1.58	7.4	44	30	9.46	5.22	11.48	1.57	16.92	7.67	.14
Nov. 19	51.9	4.89	428	1.62	7.7	44	28	18.02	10.94	22.72	1.77	35.15	14.08	.21
Water Samples from Rio San Juan Station														
Jan. 14	632	1.07	117	0.26	8.1	38	25	4.16	2.92	4.27	ϕ 1.85	6.75	2.88	.05
Feb. 16	540	1.23	138	0.28	7.5	42	29	4.47	3.14	5.61	1.64	7.88	3.73	.07
Mar. 16	427	0.96	104	0.19	7.5	33	22	4.75	2.68	3.72	2.03	6.54	2.14	.21
Apr. 16	145	1.22	124	0.24	8.0	39	24	5.05	3.13	5.19	2.49	7.89	3.29	.05
May 17	438	1.73	194	0.41	8.5	56	43	4.75	3.84	10.73	ϕ 1.13	10.14	8.48	.07
June 14	73	1.10	119	0.32	7.7	49	33	3.83	2.46	5.95	1.98	6.23	4.03	.02
July 18	2,940	0.44	51.0	0.12	7.9	26	14	2.57	0.94	1.24	1.87	2.03	0.63	.02
Aug. 12	62	0.81	88.0	0.21	8.0	37	23	3.57	2.07	3.38	ϕ 1.82	4.95	2.03	.01
Sept. 19	21.2	1.20	125	0.26	8.0	45	23	4.30	2.94	6.03	ϕ 2.17	7.94	2.96	.01
Oct. 18	653	1.72	176	0.48	8.0	47	30	5.87	4.02	8.77	ϕ 2.22	10.70	5.56	.03
Nov. 19	343	0.45	49.8	0.08	7.9	21	11	3.19	0.87	1.10	2.37	1.97	0.50	.06
Dec. 30	523	1.20	125	0.26	8.0	39	25	4.97	3.00	5.19	ϕ 2.57	7.13	3.16	.03

* Composite of 3 samples in Sept.
† Composite of 4 samples in Sept. and 4 in Oct.
♂ Composite of 30 samples
** Percent of total cations
o Composite of one sample Oct., 2 in Nov., 4 in Dec.
†† Composite of 4 samples in Nov. and 4 in Dec.
ϕ Includes carbonate
*** Percent of total anions

ELECTRICAL CONDUCTANCE OF WATER SAMPLES

San Marcial Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Jan. 4	87.9	Mar. 5	82.0	Apr. 10	71.4	May 21	41.7	July 3	57.4	Aug. 9	101	Sept. 21	79.2	Oct. 27	78.2	Dec. 2	102
Jan. 7	89.1	Mar. 6	70.9	Apr. 12	64.6	May 22	39.7	July 4	101	Aug. 10	108	Sept. 22	76.3	Oct. 28	87.7	Dec. 3	101
Jan. 14	90.3	Mar. 7	78.1	Apr. 13	63.3	May 25	41.4	July 5	91.7	Aug. 11	118	Sept. 23	78.6	Oct. 29	92.3	Dec. 4	101
Jan. 21	93.9	Mar. 8	73.5	Apr. 14	61.6	May 27	48.7	July 6	88.2	Aug. 12	117	Sept. 24	89.0	Oct. 30	88.7	Dec. 5	101
Jan. 28	102	Mar. 9	71.9	Apr. 15	59.4	May 28	66.6	July 7	73.6	Aug. 13	132	Sept. 25	130	Oct. 31	85.1	Dec. 6	104
Feb. 1	91.5	Mar. 10	68.0	Apr. 16	61.0	May 30	37.4	July 8	67.3	Aug. 14	140	Sept. 26	110	Nov. 1	97.6	Dec. 7	103
Feb. 2	87.2	Mar. 11	68.4	Apr. 18	60.1	June 1	72.7	July 9	64.4	Aug. 21	86.8	Sept. 27	107	Nov. 2	93.1	Dec. 8	101
Feb. 3	89.9	Mar. 12	68.6	Apr. 19	61.6	June 2	63.7	July 10	63.8	Aug. 23	83.4	Sept. 28	91.0	Nov. 3	91.5	Dec. 9	101
Feb. 4	88.6	Mar. 13	70.1	Apr. 20	53.8	June 3	51.7	July 11	58.5	Aug. 24	76.7	Sept. 29	87.3	Nov. 4	93.3	Dec. 10	99.4
Feb. 5	91.2	Mar. 14	70.5	Apr. 21	48.7	June 4	58.6	July 13	85.4	Aug. 25	78.9	Sept. 30	96.2	Nov. 5	91.9	Dec. 11	102
Feb. 6	87.4	Mar. 15	68.5	Apr. 22	45.1	June 5	48.4	July 14	85.1	Aug. 26	77.3	Oct. 1	89.3	Nov. 6	104	Dec. 12	102
Feb. 8	89.4	Mar. 16	68.4	Apr. 23	44.7	June 7	47.7	July 15	90.7	Aug. 27	82.9	Oct. 2	120	Nov. 7	108	Dec. 13	99.2
Feb. 9	87.9	Mar. 17	66.7	Apr. 24	60.8	June 8	44.4	July 16	91.6	Aug. 28	106	Oct. 3	161	Nov. 8	110	Dec. 14	99.0
Feb. 10	87.2	Mar. 18	71.9	Apr. 25	42.1	June 9	57.6	July 17	84.2	Aug. 29	103	Oct. 4	108	Nov. 9	110	Dec. 15	92.4
Feb. 11	75.9	Mar. 19	78.4	Apr. 27	43.8	June 10	42.5	July 18	91.0	Aug. 30	127	Oct. 5	88.7	Nov. 10	110	Dec. 16	92.7
Feb. 12	79.2	Mar. 20	75.4	Apr. 28	41.7	June 11	43.2	July 19	91.6	Aug. 31	105	Oct. 6	86.7	Nov. 11	99.9	Dec. 17	103
Feb. 13	82.5	Mar. 21	69.6	Apr. 29	41.4	June 12	43.4	July 20	97.1	Sept. 1	86.7	Oct. 7	85.6	Nov. 12	110	Dec. 18	101
Feb. 14	84.8	Mar. 22	75.0	Apr. 30	41.6	June 14	46.9	July 21	101	Sept. 2	88.2	Oct. 8	87.4	Nov. 13	116	Dec. 19	97.3
Feb. 15	83.9	Mar. 23	80.7	May 2	46.0	June 15	46.8	July 22	111	Sept. 3	90.9	Oct. 9	85.1	Nov. 14	110	Dec. 20	96.3
Feb. 16	89.7	Mar. 24	81.7	May 3	44.5	June 16	46.5	July 23	112	Sept. 4	75.6	Oct. 10	90.8	Nov. 15	106	Dec. 21	94.1
Feb. 17	97.8	Mar. 25	77.5	May 4	44.4	June 17	49.3	July 24	119	Sept. 5	80.3	Oct. 11	79.7	Nov. 16	109	Dec. 22	94.5
Feb. 18	105	Mar. 26	73.2	May 5	42.4	June 18	49.1	July 25	141	Sept. 6	91.6	Oct. 12	80.7	Nov. 17	101	Dec. 23	99.8
Feb. 19	94.3	Mar. 27	74.1	May 6	43.6	June 19	50.8	July 26	110	Sept. 7	73.8	Oct. 13	86.1	Nov. 18	94.4	Dec. 24	102
Feb. 20	86.6	Mar. 28	71.5	May 7	46.4	June 20	55.8	July 27	116	Sept. 8	72.8	Oct. 14	76.1	Nov. 19	95.3	Dec. 25	94.9
Feb. 21	83.3	Mar. 29	73.9	May 8	44.1	June 21	57.1	July 28	118	Sept. 9	67.2	Oct. 15	90.3	Nov. 20	95.7	Dec. 26	93.9
Feb. 22	78.9	Mar. 30	74.6	May 9	38.1	June 22	56.7	July 29	112	Sept. 10	90.7	Oct. 16	67.5	Nov. 21	97.6	Dec. 27	94.1
Feb. 23	77.5	Mar. 31	77.5	May 10	43.7	June 23	55.0	July 30	168	Sept. 11	70.0	Oct. 17	63.1	Nov. 22	97.4	Dec. 28	110
Feb. 24	76.7	Apr. 1	76.9	May 12	46.8	June 24	69.1	July 31	127	Sept. 12	69.5	Oct. 18	88.1	Nov. 23	95.6	Dec. 29	91.7
Feb. 25	75.1	Apr. 2	77.0	May 13	44.4	June 25	69.0	Aug. 1	108	Sept. 13	79.5	Oct. 19	107	Nov. 24	97.3	Dec. 30	90.4
Feb. 26	74.7	Apr. 3	76.4	May 14	59.3	June 26	76.1	Aug. 2	94.9	Sept. 14	77.7	Oct. 20	95.9	Nov. 25	98.2	Dec. 31	90.5
Feb. 27	86.8	Apr. 4	74.6	May 15	45.2	June 27	105	Aug. 3	97.0	Sept. 15	72.4	Oct. 21	93.0	Nov. 26	101		
Feb. 28	84.7	Apr. 5	73.0	May 16	92.0	June 28	117	Aug. 4	129	Sept. 16	73.2	Oct. 22	87.2	Nov. 27	101		
Mar. 1	72.4	Apr. 6	65.7	May 17	79.4	June 29	86.2	Aug. 5	111	Sept. 17	78.0	Oct. 23	87.5	Nov. 28	105		
Mar. 2	76.7	Apr. 7	74.9	May 18	66.9	June 30	72.3	Aug. 6	99.3	Sept. 18	77.7	Oct. 24	85.4	Nov. 29	106		
Mar. 3	77.3	Apr. 8	77.9	May 19	43.8	July 1	61.7	Aug. 7	113	Sept. 19	71.2	Oct. 25	89.7	Nov. 30	108		
Mar. 4	76.9	Apr. 9	73.1	May 20	44.4	July 2	63.4	Aug. 8	104	Sept. 20	75.3	Oct. 26	86.8	Dec. 1	101		

Rio Grande at El Paso Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Jan. 4	214	May 3	129	Aug. 23	108	Sept. 30	140	Oct. 17	198	Nov. 2	217	Nov. 18	202	Dec. 4	211	Dec. 21	173
Jan. 13	214	May 10	124	Aug. 30	117	Oct. 1	146	Oct. 18	204	Nov. 3	217	Nov. 19	211	Dec. 5	219	Dec. 22	175
Jan. 18	219	May 17	126	Sept. 7	101	Oct. 2	149	Oct. 19	201	Nov. 4	217	Nov. 20	209	Dec. 6	218	Dec. 23	182
Jan. 25	219	May 24	120	Sept. 11	90.4	Oct. 3	152	Oct. 20	202	Nov. 5	202	Nov. 21	208	Dec. 7	220	Dec. 24	186
Feb. 1	217	June 4	121	Sept. 12	87.4	Oct. 4	143	Oct. 21	210	Nov. 6	162	Nov. 22	209	Dec. 8	217	Dec. 25	191
Feb. 8	219	June 7	126	Sept. 13	99.7	Oct. 5	145	Oct. 22	214	Nov. 7	142	Nov. 23	205	Dec. 9	217	Dec. 26	194
Feb. 15	194	June 14	124	Sept. 20	131	Oct. 6	145	Oct. 23	209	Nov. 8	131	Nov. 24	202	Dec. 10	217	Dec. 27	197
Feb. 23	172	June 21	128	Sept. 21	139	Oct. 7	197	Oct. 24	209	Nov. 9	126	Nov. 25	205	Dec. 11	221	Dec. 28	197
Mar. 1	213	June 28	108	Sept. 22	128	Oct. 8	193	Oct. 25	211	Nov. 10	121	Nov. 26	203	Dec. 12	188	Dec. 29	209
Mar. 8	174	July 6	128	Sept. 23	137	Oct. 10	194	Oct. 26	206	Nov. 11	124	Nov. 27	205	Dec. 13	154	Dec. 30	211
Mar. 15	125	July 13	113	Sept. 24	122	Oct. 11	184	Oct. 27	190	Nov. 12	149	Nov. 28	207	Dec. 14	141	Dec. 31	211
Mar. 22	123	July 19	115	Sept. 25	127	Oct. 12	180	Oct. 28	217	Nov. 13	156	Nov. 29	208	Dec. 16	122		
Mar. 29	110	July 26	114	Sept. 26	149	Oct. 13	187	Oct. 29	219	Nov. 14	179	Nov. 30	208	Dec. 17	123		
Apr. 5	118	Aug. 2	102	Sept. 27	128	Oct. 14	189	Oct. 30	217	Nov. 15	179	Dec. 1	209	Dec. 18	130		
Apr. 12	130	Aug. 16	112	Sept. 28	128	Oct. 15	187	Oct. 31	197	Nov. 16	187	Dec. 2	209	Dec. 19	152		
Apr. 19	122	Aug. 19	111	Sept. 29	140	Oct. 16	191	Nov. 1	216	Nov. 17	188	Dec. 3	206	Dec. 20	160		

Fort Quitman Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Jan. 6	372	Mar. 5	447	Apr. 29	505	June 25	581	Aug. 20	113	Oct. 1	334	Oct. 25	363	Nov. 15	288	Dec. 19	231
Jan. 13	360	Mar. 12	492	May 7	546	July 2	599	Aug. 27	251	Oct. 8	445	Oct. 27	260	Nov. 22	355	Dec. 20	250
Jan. 20	378	Mar. 19	380	May 14	419	July 9	467	Sept. 3	579	Oct. 9	250	Oct. 29	388	Nov. 26	352	Dec. 23	278
Jan. 29	388	Mar. 26	466	May 21	533	July 16	403	Sept. 10	247	Oct. 11	334	Nov. 1	412	Nov. 29	364	Dec. 27	317
Feb. 5	389	Apr. 2	461	May 28	265	July 23	618	Sept. 17	222	Oct. 14	231	Nov. 5	389	Dec. 3	352	Dec. 30	335
Feb. 12	400	Apr. 9	392	June 4	264	July 30	668	Sept. 20	270	Oct. 15	259	Nov. 8	307	Dec. 6	369		
Feb. 19	420	Apr. 16	587	June 11	410	Aug. 6	415	Sept. 23	163	Oct. 21	346	Nov. 12	235	Dec. 10	367		
Feb. 26	404	Apr. 23	550	June 18	504	Aug. 13	863	Sept. 24	207	Oct. 22	369	Nov. 13	323	Dec. 13	359		

La Nutria Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Sept. 15	154	Sept. 30	253	Oct. 29	363	Nov. 4	381	Nov. 15	236	Dec. 12	363	Dec. 17	372	Dec. 27	275	Dec. 30	290
Sept. 19	214																

Upper Presidio Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Jan. 24	407	Feb. 27	420	Apr. 3	508	May 8	396	June 19	313	July 18	178	Sept. 12	73.6	Sept. 28	116	Dec. 2	361
Jan. 30	419	Mar. 6	443	Apr. 10	523	May 15	511	June 26	381	July 24	261	Sept. 13	110	Oct. 3	260	Dec. 10	370
Feb. 6	414	Mar. 16	467	Apr. 17	528	May 21	581	July 3	536	July 31	362	Sept. 18	170	Oct. 9	303	Dec. 12	377
Feb. 13	429	Mar. 20	481	Apr. 24	363	June 6	164	July 10	542	Aug. 23	61.9	Sept. 23	225	Oct. 23	295	Dec. 29	272
Feb. 20	455	Mar. 27	512	May 1	481	June 12	309	July 12	105	Aug. 28	65.8	Sept. 25	114	Nov. 15	233		

Rio Conchos near Ojinaga, Chihuahua—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Sept. 18	55.0	Sept. 24	56.3	Oct. 3	43.7	Oct. 16	76.3	Nov. 6	89.2	Nov. 24	88.9	Dec. 17	72.1	Dec. 28	68.9	Dec. 31	69.7
Sept. 23	68.3	Sept. 27	58.1	Oct. 9	64.1	Oct. 23	80.2	Nov. 14	93.9	Dec. 3	89.2						

Rio Grande City Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Jan. 4	134	Feb. 23	152	Apr. 6	156	May 14	88.8	June 21	135	Aug. 2	134	Sept. 14	85.2	Oct. 13	60.7	Nov. 22	158
Jan. 12	142	Mar. 1	149	Apr. 14	160	May 17	125	June 29	235	Aug. 9	131	Sept. 18	101	Oct. 20	132	Nov. 30	160
Jan. 18	134	Mar. 8	147	Apr. 20	170	May 25	136	July 6	214	Aug. 18	83.3	Sept. 22	84.0	Oct. 25	92.0	Dec. 16	148
Feb. 1	132	Mar. 16	134	May 1	155	June 2	112	July 11	106	Aug. 25	114	Sept. 27	77.1	Nov. 4	112	Dec. 22	156
Feb. 8	144	Mar. 22	130	May 6	163	June 7	66.2	July 19	60.2	Sept. 1	105	Oct. 1	107	Nov. 9	136	Dec. 29	175
Feb. 16	151	Mar. 31	145	May 12	129	June 14	101	July 26	117	Sept. 8	106	Oct. 9	65.7	Nov. 10	158		

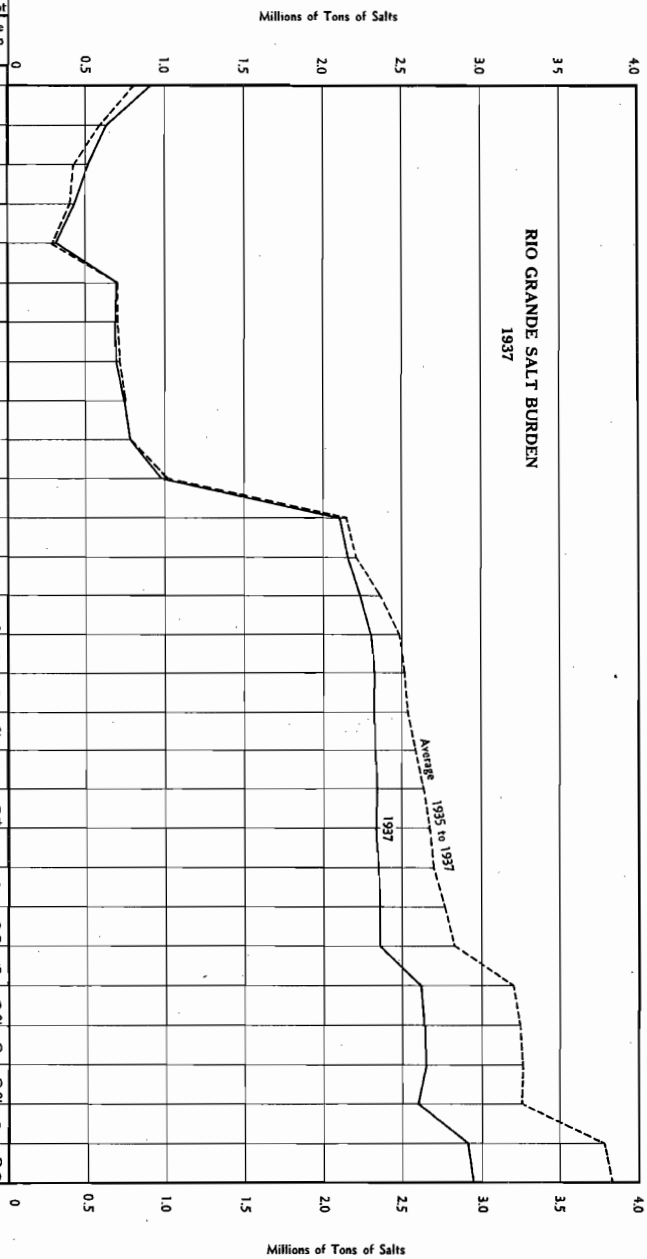
Lower Brownsville Station—1937

Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C	Date	Kx10⁵ @25°C
Jan. 4	138	Jan. 19	135	Feb. 11	157	Feb. 24	157	Mar. 11	146	Apr. 6	141	Apr. 24	166	May 8	150		
Jan. 9	133	Jan. 27	135	Feb. 15	152	Mar. 1	156	Mar. 27	127	Apr. 10	152	Apr. 29	169	May 13	150		
Jan. 14	135	Feb. 1	133	Feb. 19	160	Mar. 6	147	Apr. 1	152	Apr. 15	160	May 3	172	May 24	198		

RIO GRANDE SALT BURDEN

The graphical and tabular results below are based upon the chemical analyses shown on the preceding pages as well as upon similar data in previous Water Bulletins. For some main river stations and some tributaries the results are based upon curves showing the relationship between salt concentration and amount of stream flow. For other stations and tributaries the results are arrived at by secondary deductions.

	Concentration Tons/Acre Foot	
	1937	Average 1935 to 1937
SAN MARCIAL	.58	.70
UNMEASURED		
EL PASO	1.13	1.18
UNMEASURED		
FORT QUITMAN	2.88	2.64
UNMEASURED		
LA NUTRIA	2.40	2.37
UNMEASURED		
UPPER PRESIDIO	2.03	1.99
RIO CONCHOS	.66	.61
UNMEASURED	.95	.86
LOWER PRESIDIO	.95	.86
ALAMITO CREEK	.32	.56
TERLINGUA CREEK	.58	.46
UNMEASURED	.49	.40
JOHNSON RANCH	.87	.78
UNMEASURED	.56	.51
LANGTRY	.78	.70
PECOS RIVER	4.30	2.87
GOODENOUGH SPRING	.58	.57
DEVILS RIVER	.34	.26
UNMEASURED	.58	.50
DEL RIO	1.18	.89
SAN FELIPE CREEK	.59	.59
PINTO CREEK	.59	.59
RIO SAN DIEGO	.58	.32
RIO SAN RODRIGO	.36	.79
UNMEASURED	1.13	.40
EAGLE PASS	1.15	.84
RIO ESCONDIDO	.55	.59
UNMEASURED	.49	.40
EL JARDIN (Estimated)	1.15	.81
UNMEASURED	.49	.40
LAREDO	1.15	.80
RIO SALADO	1.63	1.25
UNMEASURED	.49	.40
ZAPATA	1.17	.82
RIO ALAMO	.49	.40
UNMEASURED	1.15	.80
ROMA	1.16	.82
RIO SAN JUAN	.92	.70
UNMEASURED	.49	.40
RIO GRANDE CITY	1.11	.79



RESULTS OF BACTERIOLOGICAL EXAMINATION OF WATER SAMPLES FROM THE RIO GRANDE NEAR EL PASO, TEXAS

The bacteriological examinations reported below were made by the City-County Health Unit, El Paso, Texas, from samples of Rio Grande water taken by the United States Section of the International Boundary Commission.

At El Paso Gaging Station

Four Miles Northwest of El Paso, Texas

Date 1937		Hour	Total Bacteria Per Sq. Cm. in Agar-Agar at 37.5° C.	Bacilus Coli Per 100 c. c.	Water Temperature °C.	River Flow Sec. Ft.
June	14	2:20 P. M.	360	1,300	24.3	1,207
July	12	2:00 P. M.	290	1,300	27.8	1,492
July	26	10:20 A. M.	263	1,100	24.7	1,386
August	9	9:00 A. M.	475	1,300	26.3	1,344
August	23	10:30 A. M.	173	1,300	24.9	1,450
September	13	10:00 A. M.	800	9,200	22.5	1,351
September	27	6:50 A. M.	113	2,800	20.8	745
October	11	10:05 A. M.	23	950	20.6	334
October	25	9:25 A. M.	31	3,500	20.1	216
November	8	1:20 P. M.	9	1,100	18.9	534
November	22	10:15 A. M.	195	490	11.3	159
December	13	10:25 A. M.	106	790	11.8	452
December	27	9:30 A. M.	4	170	12.2	233

Just Above Ysleta-Zaragoza Bridge

Fifteen Miles Southeast of El Paso, Texas

Date 1937		Hour	Total Bacteria Per Sq. Cm. in Agar-Agar at 37.5° C.	Bacilus Coli Per 100 c. c.	Water Temperature °C.
June	14	3:20 P. M.	6,333	240,000	24.7
July	12	3:25 P. M.	8,000	240,000	30.4
July	26	2:00 P. M.	5,150	130,000	24.8
August	9	1:55 P. M.	5,750	110,000	31.2
August	23	1:10 P. M.	1,500	170,000	29.5
September	13	1:30 P. M.	7,600	220,000	25.9
September	27	3:30 P. M.	5,400	920,000	28.2
October	11	1:30 P. M.	3,700	350,000	19.7
October	25	11:00 A. M.	2,400	280,000	19.8
November	8	2:20 P. M.	181	130,000	17.9
November	22	11:40 A. M.	790	9,300	11.8
December	13	12:05 P. M.	3,300	49,000	11.5
December	27	10:35 A. M.	1,500	79,000	10.5

DISSOLVED OXYGEN IN RIO GRANDE WATER NEAR EL PASO

The following determinations of dissolved oxygen in Rio Grande water near El Paso, Texas, were furnished by the Department of Water and Sewerage of the City of El Paso. The outfall into the river from El Paso City Sewage Disposal plant is 7.1 river miles below the El Paso Gaging Station.

Date 1937		Dissolved Oxygen Immediately above El Paso Sewage Outfall		Dissolved Oxygen		Miles Below El Paso Sewage Outfall	Dissolved Oxygen		Miles Below El Paso Sewage Outfall	Water Temperature °C.
		Parts Per Million	Percent Saturation	Parts per Million	Percent Saturation		Parts Per Million	Percent Saturation		
Jan.	29	8.50	82.5	7.50	72.8	2.5	7.90	76.6	4.5	14.0
Mar.	26	8.10	82.7	6.70	68.4	2.5	7.15	72.9	5.5	16.0
Apr.	22	6.60	74.6	5.40	61.0	0.4	6.75	76.3	* 8.8	21.0
May	26	6.80	77.7	6.05	69.1	3.0	5.05	57.7	6.0	22.0
June	18	6.70	79.8	5.30	63.1	1.2	5.65	67.3	5.3	24.0
June	25	6.00	76.9	5.40	69.2	4.0	5.80	74.4	* 8.8	28.0
July	20	5.95	73.5	6.20	76.5	2.5	5.50	67.9	* 8.8	26.0
July	30	6.40	79.1	6.10	75.3	6.0				26.0
Aug.	14	6.40	78.0	5.10	62.2	2.0	6.40	78.0	* 8.8	25.5
Sept.	7	6.10	74.4	5.50	67.1	1.9	4.80	58.5	6.9	25.5
Sept.	23	6.30	76.8	5.50	67.1	5.0	6.00	73.2	* 8.8	25.0
Dec.	20	8.90	82.4	8.20	75.9	3.7	7.60	70.4	* 8.8	11.0

* The Ysleta-Zaragoza bridge is 8.8 river miles below the El Paso sewage outfall.

RESULTS OF BACTERIOLOGICAL EXAMINATION OF WATER SAMPLES FROM THE RIO GRANDE AT NUEVO LAREDO, TAMAULIPAS

The chemical and bacteriological analyses of water shown here were made by the Federal Board of Public Improvements at Nuevo Laredo, Tamaulipas, Mexico, from samples of water taken from the Rio Grande by means of the pumps of the city water service, under the supervision of such Board.

Period	Chemical Analysis — Parts per Million					Bacteriological Analysis	
	Turbidity	Total Alkalinity	Phenolphthalein Alkalinity	Total Hardness	Magnesia	Total Bacteria Per Sq. Cm. in Agar-Agar at 37.5° C.	Bacilus Coli Per 100 c. c.
Average — 1937							
January	31	153	5	336	44	117	31
February	28	149	5	349	45	94	34
March	26	145	5	334	45	123	47
April	27	145	6	368	50	176	50
May	152	123	5	299	40	646	62
June	5,237	109	6	362	36	9,430	1,086
July	273	96	5	396	37	717	219
August	1,292	100	5	299	33	4,012	448
September	10,275	106	4	239	23	9,100	2,710
October	4,918	120	5	227	24	6,273	1,787
November	486	138	7	366	47	482	117
December	297	140	7	390	53	871	384
Total	23,042	1,524	65	3,965	477	32,041	6,975
Average	1,920	127	5	330	40	2,670	581
Minimum	26	96	4	227	23	94	31
Maximum	10,275	153	7	396	53	9,430	2,710
Minimum — 1937							
January	27	145	3	270	32	4	5
February	26	130	3	320	32	10	5
March	25	130	5	300	36	40	5
April	25	130	3	320	42	82	10
May	34	90	3	225	28	35	10
June	238	75	3	170	22	260	50
July	35	65	3	205	20	85	10
August	70	75	3	214	12	60	10
September	248	67	3	119	10	145	100
October	564	105	3	120	14	540	100
November	237	117	3	247	24	75	10
December	68	115	3	317	46	52	10
Maximum — 1937							
January	35	165	8	395	60	296	100
February	30	160	8	380	68	220	100
March	28	155	8	375	56	455	100
April	38	157	8	405	64	500	100
May	2,310	135	10	375	54	5,650	100
June	19,717	145	8	730	52	47,500	10,000
July	1,422	130	8	650	54	4,400	1,000
August	15,183	130	8	422	50	77,500	10,000
September	32,700	130	10	359	44	62,000	10,000
October	14,730	145	8	330	48	15,000	10,000
November	871	155	10	450	66	1,300	1,000
December	1,380	152	15	424	66	5,700	1,000
Annual Averages — 1932 to 1937							
1932	1,434	131.6	4.36	339.9	22.72	7,878	2,357
1933	644	133	5.0	297	23.4	2,193	499
1934	494	132	5.3	262	25.9	4,717	947
1935	1,298	128	5.7	245	30.0	7,878	1,858
1936	1,292	135	5.1	275	34.6	1,373	409
1937	1,920	127	5.0	330	40.0	2,670	581
Totals	7,082	786.6	30.46	1,748.9	176.62	26,709	6,651
Averages	1,180	131.1	5.08	291.5	29.44	4,452	1,108

RAINFALL ON UNITED STATES SIDE OF RIO GRANDE WATERSHED—1937

Rainfall at Ft. Bliss, Texas

Standard 8 inch rain gage. Record by U.S. Army — Record began Jan. 15, 1924

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Normal 1924-1938
January																															.10	.10	.29
February	.04	.02	T					.22								.10	.02															.40	.38
March				.10	.51	.01										T	T													.02		.64	.27
April																				T												T	.32
May							.02			T									.04				.02						.19	.02		.29	.61
June																					.05				.06	.03	.27					.41	.32
July		T	T	.06	.06		.02		.09		.02								.27	.03	T					T						.55	1.49
August	.05	.47									T	T	.04	T		.44	.01		.01	.03					.01	.05						1.11	2.17
September				T		.99	T			.01	.08	.20								T	T	.22										1.50	1.21
October										.38	.11	1.07	.08																			1.64	.76
November							T	.15																								.15	.45
December		.02	.04	T								.04	.22	.07						.04	.06	T					.13					.62	.43
																															Yearly	7.41	8.68

Rainfall at Fort Quitman, Texas

Automatic recording rain gage. Record by U.S. Section I.B.C. — Record began Jan. 1, 1937

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Average
January																															.24	.24	
February	.02	.03		.01				.04																								.10	
March				.06	.03	.01																										.10	
April																			.76													.76	
May																						.06						.10				.16	
June	.15																									.05						.20	
July									.13	.12	.04																					.29	
August										1.12			.01					.08					.08			T	T					.25	
September *			.01		.06	.02																											
October *								.56			.80	.25	*																				
November *																																	
December *	Note: * Record from Sept. 4 to Oct. 12 incomplete and no record after Oct. 12.																																
																															Yearly		

Rainfall at Candelaria, Texas

Standard 8 inch rain gage. Record by U.S. Section I.B.C. — Record began Nov. 2, 1935

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Average 1935-1937
January																															.10	.10	.14
February	.13							.11																								.24	.12
March					.06																											.06	.89
April																																0	.05
May					.15																				.20						.32	.67	.82
June	.40		.34																													.74	.40
July											1.28	.65								.57	.52	.30										3.32	2.41
August																					.35											.35	1.18
September								.35	.40	.65														.85								2.25	3.76
October												1.15		.15																		1.30	.65
November	.30								.25																							.55	.44
December		.28		.18									.32															.52				1.30	.87
																															Yearly	10.68	11.71

Rainfall at Marfa, Texas

Standard 8 inch rain gage. Record by U.S. Army — Record began March, 1928

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Normal 1928-1937
January													T	T																	.04	.04	.37
February	.13	T						.01										.03	.10													.27	.72
March				T	T										T		T					T										T	.18
April													T						.10													.10	.72
May					.33	.02					.03		T				T		T					T				.03		T	.01	.42	.95
June	.20		.25				T	T							T			.03											.05			.51	1.32
July	T	T					.10	.01		.48	.44					.28						.30										1.61	1.79
August	T				T				T			.05				.56	.95	.05	.28	.01	.51	.08		.37		.01						2.87	3.09
September		T	.18			.03		T		T	1.45	T						T		T	.06	.66	.02	.06								2.46	2.47
October												.67	T	T	T															T		.67	.88
November	.56	.10					T	.20																								.86	.56
December		.01	.08	.16									.25	T	T					T	.37				.01		.08	.50				1.40	.45
																															Yearly	11.21	13.50

Rainfall at Johnson Ranch, Texas

Standard 8 inch rain gage. Record by U.S. Section I.B.C. — Record began July 1, 1933

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Average 1933-1937
January																																0	.13
February																																.16	.16
March																																0	.12
April																																0	.20
May										.19	.35										.30					2.60						3.35	1.37
June		.60	.03					.27		1.28						.03																2.21	1.00
July																						.27	.57									.84	1.18
August																	.10			.23				.50								.83	.55
September											.75																					.75	1.61
October								.28																								.28	.50
November			.39																													.39	.68
December				.42										1.30								.38										2.10	.55
																															Yearly	10.91	7.43

Rainfall at Dryden, Texas

Standard 8 inch rain gage. Record by U.S. Army — Record began Jan. 1, 1931

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Average 1931-1937
January							T														T						T		T		.07	.07	.43
February	.23							.32										.12								.11						.78	.54
March				.01	.47	.22						.10					T															.80	.48
April																		.15	.06	.58												.79	1.03
May						.12				.19	T	.07		.09											.12							.59	2.24
June		.47	.15			T				.09																		T				.71	.80
July										T																						T	1.26
August																		.05			.04			T		.14						.23	1.71
September			T									.88							T						.73							1.61	3.02
October										T				.59	T		.17															.76	.81
November			T	T				.43																						T		.43	.41
December	.02	.15		.02				T	T	T				.30	.42					T	T	.44					T	1.31	.04			2.70	.90
																															Yearly	9.47	13.63

Rainfall at Zapata, Texas

Standard 8 inch rain gage. Record by U.S. Section I.B.C. — Record began April 22, 1932

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Average 1932-1937
January																												.33	.19		.02	.54	.79
February	.02		.58	.01																												.61	.81
March		.21			.20			.25											.13										.26			1.05	.67
April													.10											.48								.58	1.17
May	T					.58						.13		.61																	.55	1.87	2.70
June																																0	1.10
July				.10	.15		.20		.40																							.85	1.06
August																.19											.11					.26	1.16
September																	.11															.11	4.25
October										.56	.14						.32															.82	.86
November			.14																			.14										.28	.45
December	.24		.53								.15				.26					.72	.30				.05	.04		.90				3.19	1.18
																															Yearly	10.16	16.20

RAINFALL ON MEXICO SIDE OF RIO GRANDE WATERSHED

INCHES

Juarez, Chih. — Latitude 31.8° — Longitude 106.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1925	.16	.47	T		2.13	.46	2.51	2.20	1.30	2.56	.04	.27	
1926	.60	.00	1.18	.81	.56			.65	2.05	1.02	.24	1.17	
1927	.03	.31	.35	.00	.00	.08	2.72	2.42	.51	T	.00	.51	6.93
1928			T	.20	.83	.00	.65	3.05	.12	.87	.77	.22	
1929	T	.16	.61	.00	1.30	.65	2.17	1.87	.08	1.28	.37	.24	8.73
1930	.10	.20	T	T	.41	.53	.53	.18	T	.59	.65	.39	3.58
1931	.73	1.28	.49	2.16	.01	.76	.68	1.29	1.16	.26	.49	.39	9.70
1932	.15	.30	.03	T	.98	.12	.80	1.11	3.46	2.07	.00	.48	9.50
1933	.27	.31	.00	.11	.02	1.75	.91	.14	.46	1.01	.15	.00	5.13
1934	T	.55	.37	.03	.68	.26	.44	.45	.13	.79	.31	.23	4.24
1935	.09	.54	.24	T	.08	.14	.14	1.86	1.15	.31	1.24	.49	6.28
1936	.67	.05	.00	.13	.39	.12	.67	2.81	4.13	.39	1.47	.30	11.13
1937	.16	.32	.58	.00	.16	.45	.70	.89	.31	1.46	.85	.69	6.57
Normals	.25	.37	.30	.29	.58	.44	1.08	1.46	1.14	.97	.51	.41	7.80

Villa Gonzalez, Chih. — Latitude 30.6° — Longitude 106.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1921	.12	.37	.20	.04	.08	.43	4.69	2.32	2.87	.02	.79	.43	12.36
1922	.00	.00	.34	.59	.43	.00	3.08	.67	.16	.59	.04	.00	5.90
1923	.28	.66	.08		.00	.83	1.21	4.44	1.06	.91	.19	.35	
1924	T	T	.60	.35	.12	T	2.23	1.64	.52	.46	.00	.81	6.73
1925	.02	.15	.02	.00	1.50	1.00	1.12	3.30	.13	1.14	T	.18	8.56
1926	.53	.33	1.11	1.13	.43	.41	1.21	.47	1.94	1.06	.32	.95	9.89
1927	.03	.14	T	.00	.00	.12	2.78	2.14	1.38	T	T	.78	7.37
1928	T	.36	.09	.42	.98	.26	1.31	4.46	1.08	.39	.38	.60	10.33
1929	.02	.45	.17	T	1.24	.10	1.51	1.43	1.44	3.21	.30	.20	10.07
1930	.10	.34	.24	.24	.30	.10	2.03	.30	.26	.93	.38	.34	5.56
1931	.48	.46	.08	1.87	.37	.20	.96	.88	.95	.09	.38	.15	6.87
1932	.18	.38	.10	.06	T	.10	.69	.89	2.40	.11	T	.10	5.01
1933	.15	.10	T	.08	.33	.40	2.00	.91	.19	1.50	.08	.00	5.74
1934	.03	.05	.32	.09	.06	.33	.09	.98	T	.55	.57	T	3.07
1935	T	.13	.00	T	T	.30	.09	.39	2.07	.70	1.18	.28	5.14
1936	.55	.00	.51	T	T	.20	1.97	.20	4.57	.79	1.54	.24	10.57
1937	.08	T	.01	T	T	.02	T	4.21	5.94	.91	2.05	2.57	15.79
Normals	.15	.23	.23	.30	.34	.28	1.59	1.74	1.59	.79	.48	.47	8.19

Delicias, Chih. — Latitude 28.2° — Longitude 105.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1932								4.35	.78	.61	T	.00	
1933	.00	.00	.08	.55	.55	.18	1.91	2.58	.73	.10	.08	.02	6.78
1934	.61	.31	T	.00	.10	1.20	1.36	2.62					
1936	T	.00	.16	.22	.12	.06	1.89	.85	4.33	.61	1.12	T	9.36
1937	.00	.22	.00	T	.16	.10	1.77	2.58	4.25	.20	.20	1.18	10.66
Average	.15	.13	.06	.19	.23	.38	1.73	2.60	2.52	.38	.35	.30	9.02

San Luis, Chih. — Latitude 28.7° — Longitude 106.3°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1928	T	.08	T	.31	.75	T	1.62	3.03	.39	.89	.33	.51	7.91
1929	.16	.02	T	.00			2.13	4.33	1.14	2.17	.00	.67	
1930	.47	.20	.10	.08	.08	.71	3.07	1.10	.00	.98	.08	1.46	8.33
1931	1.89	1.18	.12	1.32	.24	.39	1.26	5.12	3.15	T	T	.00	14.67
1932	T	.79	T	.00	.00	2.32	5.61	1.49	1.73	T	.00	.50	12.44
1933	.45	.48	.00	T	.64	3.03	1.11	7.99	3.29	2.40	T	.00	19.39
1934	.03	.44	.19	.29	.21	.20	2.33	1.50	.24	.48	.32	.39	6.62
1935	T	.22	T	T	.13	.66	.89	4.15					
1936	T	T	.19	.95	T	1.35	1.56	.67	2.38	.31	2.05	.49	9.95
1937	.98	.81	.01		.02								
Normals	.40	.42	.06	.33	.23	1.08	2.18	3.26	1.54	.90	.35	.50	11.25

Chihuahua, Chih. — Latitude 28.6° — Longitude 106.1°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1921	.00	.55	T	T	.37	.77	3.09	3.74	5.15	.39	.06	.02	14.14
1922	T	.04	.02	.15	T	1.61	3.49	.42	3.69	1.09	.04	T	10.55
1923	.37	.43	1.23	T	.02	2.13	3.63	6.29	7.11	.95	1.42	1.69	25.27
1924	.14	.47	T	.20	.04	T	2.44	3.07	1.85	.87	.18	1.21	10.47
1925	.03	.20	.36	.00	1.14	1.52	2.99	7.09	1.87	2.69	.20	1.71	19.80
1926	.16	.20	.10	1.65	.09	.53	2.60	4.43	1.98	2.89	.18	.31	15.12
1927	.04	.09	.50			.80	3.63	1.27	4.38	1.18	.04	.88	
1928	.55	T	.26	.10	1.26	.35							
1929	T	T											
1933	.20	.12										.00	
1934		.00	.05	.96	1.30	1.06	2.17	3.13	1.65	.31	.00		
1937	T	.08	T	.00	.24	.16	1.69	2.01	5.42	.40	.67	1.20	11.87
Normals	.14	.18	.25	.34	.50	.89	2.86	3.49	3.68	1.20	.31	.78	14.62

El Mulato, Chih. — Latitude 29.3° — Longitude 104°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926					1.05	1.44	.48	3.67	1.65	.08	.28	.83	
1927	.02	.04	.26	.18	.00	.51	1.59	.94	1.60	T	.00	1.04	6.18
1928	.37	.49	.00	.13	.39	.67	.00	.00	2.05	.77	1.01	.56	6.44
1929	.00	.08	.18	.24	1.22	2.30	.78	.82	1.88	1.34	T	.36	9.20
1930	.04	.08	.12	.16	.47	1.14	2.19	1.63	.12	1.30	1.13	.44	8.82
1931	2.11	1.28	.22	2.71	.87	.49	1.19	.59	.00	.13	.16	.58	10.33
1932	.10	.63	.28	.20	.30	.16	1.46	2.06	3.18	.21	.00	.80	9.38
1933	.08	T	.08	T	.05	.64	.98	1.18	.29	1.39	.02	.00	4.71
1934	.09	T	T	.13	.01	.44	1.17	1.23	.00	.00	.04	T	3.11
1935	.15	.62	.20	.00	.70	1.02	.33	1.73	2.43	.21	.13	.70	8.22
1936	.10	.00	.32	.00	2.81	.00	2.41	2.43	1.64	5.82	.08	.85	16.46
1937	.05	.14	T	.00	.26	1.13	.32	.61	1.41	.60	.17	1.54	6.23
Normals	.28	.31	.15	.34	.68	.83	1.08	1.41	1.35	.99	.25	.64	8.31

Piedras Negras, Coah. — Latitude 28.7° — Longitude 100.6°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922							.77	.04	4.37	.48	.63	T	
1923	.44	4.43	2.59	1.50	.28	1.64	2.33	1.26	3.28	1.63	2.72	1.22	23.32
1924	.39	.70	.43	2.05	6.16	.37	T	.00	3.21	.30	.00	.30	13.91
1925	T	.00	.67	.81	8.05	.20	.20	T	2.44	1.67	.94	1.16	16.14
1926	.85	T	1.12	7.30	2.38	.20	2.99	1.02	.61	2.57	.79	1.85	21.68
1927	.47	1.57	.83	.20	T	4.91	1.38	.98	1.63	1.86	.00	2.02	15.85
1928	.77	1.09	.14	1.00	4.38	1.09	1.32	2.67	14.50	.75	.77	.53	29.01
1929	.33	T	.51	.98	2.87	.16	1.71	T	7.49	2.91	.49	1.98	19.43
1930	T	.20	1.14	1.52	3.92	4.04	1.63	.00	T	4.26	3.09	.47	20.27
1931	5.38	.91	1.59	1.32	5.35	5.26	1.49	3.97	.00	T	.43	2.81	28.51
1932	2.54	1.73	.43	2.19	1.30	2.03	1.52	9.82	7.68	.81	13.66	7.19	50.90
1933	6.06	1.10	.59	.00	2.58			.00	.00				
1935												2.48	
1936	.08	.04	.31	1.18	2.76	1.97	.87	T	1.50	.28	.08	.00	9.07
1937	.00	.00	.47	.00	.20	.00	.83	.00					
Normals	1.33	.91	.83	1.54	3.09	1.82	1.31	1.41	3.59	1.46	1.97	1.69	20.95

Nueva Rosita, Coah. — Latitude 28.2° — Longitude 100.8°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1925								1.51	5.43	1.95	T	1.73	
1926					1.69	.67	5.08	.35	2.87	.91	.10	.23	
1927	.12	.43	.12	.14	1.02	7.81	1.10	.87	.30	2.83	.00	1.42	16.16
1928	1.10	.96	.12	.49	1.22	T	.47	1.59	5.28	T	T	.79	12.02
1929	T	.04	1.02	.18	3.94	.94	.65	.47	1.42	.96	T	.93	10.55
1930	.00	T	1.69	7.50	4.59	3.56	.89	T	.14	8.88	4.65	.26	32.16
1931	4.19	.41	1.99	.93	5.87	2.62	1.20	1.83	.00	.00	T	1.10	20.14
1932	.53	2.13	.22	.59	1.99	.00				1.20	.53	.14	
1933	.12	.77	.00	.83	.35	1.69	2.54	5.20	2.66	2.80	.00	.00	16.96
1934	.59	T	.00	3.17	1.77	.00	4.57	.61	1.52	.00	.00	.39	12.62
1935	1.20	.49	.14	.14	4.09	5.45	2.66	.57	1.87	.49	.89	3.68	21.67
1936	.00	.00	.98	.00	5.06	.28	1.67	2.42	.89	1.28	4.23	.61	17.42
1937	T	T	.59	.00	2.70	1.89	1.95	1.50	T	.22	.94	1.59	11.38
Normals	.71	.48	.62	1.27	2.86	2.08	2.07	1.41	1.86	1.66	.87	.99	16.88

Nueva Laredo, Tamps. — Latitude 27.5° — Longitude 99.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1924	.69	1.04	.20	.08	2.13	.98	.00	T	1.16	.00	.00	.15	6.43
1925	.00	.00	.59	.20	.93	.08	T	2.04	8.83	.24	2.38	1.19	16.48
1926	1.09	.00	1.15	3.30	4.07	.55	2.19	.09	T	3.13	.34	1.82	17.73
1927	.35	.47	.78	.30	1.28	3.19	.15	.58	.90	.74	.42	.79	9.95
1928	2.02	1.99	.30	.47	3.65	.00	.85	.13	2.64	.78	1.88	2.06	16.77
1929	T	.39	1.38	1.46	4.31	.50	.61	T	1.14	.44	1.55	.56	12.34
1930	.04	.87	.63	1.76	2.62	1.20	.51	.00	.68	4.94	3.57	.04	16.86
1931	4.48	1.00	1.06	.39	8.50	1.52	4.41	3.65	.90	.03	.10	2.31	28.35
1932	1.09	.74	.40	1.96	2.72	1.58	.12	1.69	3.26	.29	T	.36	14.21
1933	T	1.19	.19	.73	.27	1.96	1.26	3.02	6.23	1.50	.43	.28	17.06
1935	.27	1.85	1.87	1.44	3.92	5.74	2.43	.22	4.10	.74	1.95	2.81	27.34
1936	.09	.28	.32	1.85	6.64	2.76	1.87	2.06	4.34	.81	.30	.68	22.00
1937	.22	.17	.46	T	.65	.01	.64	.70	1.40	.18	.08	2.74	7.25
Normals	.80	.77	.72	1.07	3.21	1.54	1.16	1.09	2.74	1.06	1.00	1.21	16.37

La Mariposa, Coah. — Latitude 28.2° — Longitude 101.8°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1921	.00	.42	.31	.25	1.80	6.00	.80	1.41	.36	1.30	.11	.00	12.76
1922	.12	.12	.11	.91	3.45	20.72	1.14	.13	7.51	1.76	.68	.00	36.65
1923	.61	2.57	2.50	.75	1.53	1.63	1.16	1.31	9.63	1.61	3.70	2.55	29.55
1924	.39	1.56	.11	1.51	4.16	2.18	.51	1.35	23.31	1.19	.00	.52	36.79
1925	.00	.00	2.49	1.79	3.41	.70	2.24	4.84	6.63	2.22	.00	1.43	25.75
1926	.73	.00	.68	5.61	1.28	3.42	4.48	.14	.57	3.02	.78	.35	21.06
1927	.13	.00	.07	.13	1.62	4.70	4.28	.05	.92	.69	1.60	.00	14.19
1928	1.16	.80	.22	.29	1.76	1.90	1.93	2.30	8.12	.54	.44	.48	19.94
1929	.00	.16	.88	.41	3.21	.90	1.88	.47	4.37	3.38	.04	.82	16.52
1930	.15	.00	.45	1.00	8.63	4.78	3.69	.00	.29	8.32	4.05	.30	31.66
1931	3.79	.71	.88	1.94	5.57	2.67	2.50	3.19	.10	.00	.35	1.60	23.30
1932	.29	1.62	.40	.21	2.17	1.86	2.85	8.60	21.55	3.23	.37	.47	43.62
1933	.25	.57	.06	.30	.61	.91	2.17	7.94	4.35	.33	.47	.00	17.96
1934	.45	.04	.84	1.16	.49	.06	4.14	.22	2.14	.27	.09	.56	10.46
1935	3.29	.58	.05	.33	1.41	8.30	3.65	3.51	7.48	4.66	.55	1.55	35.36
1936	.00	.00	1.99	.65	5.55	.17	8.76	2.71	3.32	1.72	4.87	.36	30.10
1937	.04	.12	1.03	.00	2.36	1.08	2.10	.11	2.62	.14			
Normals	.71	.58	.82	1.08	3.06	3.87	3.02	2.39	6.45	2.15	1.21	.73	26.07

Muzquiz, Coah. — Latitude 27.8° — Longitude 101.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1923						.49	1.72	3.07	12.98	1.30	3.67	1.93	
1924	.87	1.37	.31	1.19	4.25	T	.47	.62	16.67	T	T	.47	26.22
1925	T	T	2.51	1.51	5.61	1.95	3.73	3.76	10.74	2.19	T	1.63	33.63
1926	.19	.01	.72	1.72	.54	3.05	4.81	1.00	.64	5.05	.35	.44	18.52
1927	.29	.29	1.38	.11	1.00	7.35	.64	T	.37	3.80	.01	.57	15.81
1928	1.43	1.04	.20	.61	5.64	.37	2.55	4.76	8.38	.50	.48	.35	26.31
1929	.09	.06	1.47	.18	2.73	.11	3.50	1.30	7.09	2.67	.42	1.31	20.93
1930	.05	.06	1.84	2.23	7.29	7.65	4.92	T	.52	11.20	6.44	.22	42.42
1931	4.30	.43	3.10	1.27	5.83	6.93	1.02	1.06	.07	T	.27	2.55	26.83
1932	.24	.87	.26	.26	3.49	.31	1.02	14.59	24.31	3.19	.70	.18	49.42
1933	.22	.67	.06	.25	.44	6.61	1.49	8.47	.66	3.16	.21	.01	22.25
1934	.91	.04	.26	2.56	2.93	.00	2.60	.01	2.83	.30	.12	.35	12.91
1935	2.83	.63	.16	.79	2.09	5.43	3.94	1.57	5.30	3.74	1.91	3.74	32.13
1936	T	.20	2.09	.89	4.21	.20	4.84	2.09	1.81	1.85	5.67	1.14	24.99
1937	.39	.04	.81	.59	6.10	1.14	.71	.79	3.70	2.36	.20	5.63	22.46
Normals	.84	.41	1.08	1.01	3.72	2.77	2.53	2.87	6.40	2.75	1.36	1.37	27.11

Don Martin, Coah. — Latitude 27.6° — Longitude 100.7°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1927						6.65	1.57	2.21	.12	2.66	.20	1.21	
1928	.66	2.39	.32	.57	2.58	T	.17	.57	4.42	.40	.77	1.46	14.31
1929	.43	.10	.36	2.54	2.07	.09	.68	.22	1.87	1.01	.87	.13	10.37
1930	.08	.28	.68	1.47	4.59	1.04	.63	T	2.11	8.27	3.29	.02	22.46
1931	4.47	.46	2.28	.98	2.52	1.64	2.33	3.24	.24	T	.16	2.44	20.76
1932	.56	.44	.83	2.56	1.75	.06	.02	1.70	13.12	.14	.36	.40	21.94
1933	.04	1.86	.37	1.48	.09	2.30	1.81	3.64	6.15	1.46	.31	.04	19.55
1934	1.32	.46	.59	3.92	.40	.00	2.62	.00	.70	.07	.06	.97	11.11
1935	1.44	.28	.98	.02	1.05	5.39	1.44	2.26	3.33	3.73	.54	2.36	22.82
1936	.07	.06	.58	.97	3.11	.61	2.00	1.96	1.30	.93	1.33	.71	13.63
1937	.09	.16	.50	.00	4.93	1.45	2.37	.00	2.68	.50	1.48	2.66	16.82
Normals	.92	.65	.75	1.45	2.31	1.75	1.42	1.44	3.28	1.74	.85	1.13	17.69

Monclova, Coah. — Latitude 26.9° — Longitude 101.4°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1921		.11	.13	.33	.85	1.54	.74	.51	.13	T	.19	T	
1922	.00	.00	.24	.98	1.80	2.19	4.10	.50	6.00	.87	.47	.00	17.15
1923	.09	2.13	1.48	.02	.88	.63	1.05	1.39	13.14	1.16	1.99	2.03	25.99
1924	.32	1.02	.02	.28	2.44	.30	.14	1.29	5.55	T	.00	.31	11.67
1925	T	.00	.10	.82	.29	.46	3.22	.71	4.54	1.92	.26	1.31	13.63
1926	.95	T	.33	2.72	1.66	1.80	7.30	.13	T	2.38	.76	.25	18.28
1927	.18	.35	T	.44	1.15	3.24	2.67	2.46	.86	1.74	.14	.14	13.37
1928	.46	2.14	.18	.45	1.48	.31	.81	2.21	3.66	.18	1.42	.81	14.11
1929	.08	.04	.12	1.06	2.07	.47	1.77	.43	5.02	1.36	.69	T	13.11
1930	.44	.35	.43	.87	2.63	1.92	1.78	.20	.35	7.91	.87	2.96	20.71
1931	3.74	.67	.83	.94	2.72	1.85	.12	1.89	.28	T	T	1.30	14.34
1932	.28	.20	.31	.39	1.02	.16	2.17	.83	14.47	.87	.20	.08	20.98
1933	.08	1.65	.28	.28	.61	1.06	1.61	3.98	3.50	1.85	.47	.00	15.37
1934	.16	.08	T	.28	T	.75	.79	1.38	2.83	T	T	.12	6.39
1935	1.72	.46	.31	.39	1.22	4.76	2.76	T		.16	.17	1.79	
1936	T	.00	.87	.39	2.13	.72	3.15	1.97	1.36	.55	.87	.51	12.52
1937	T	T	.08	T	6.20	.69	1.87	.64	2.56	T	T	1.71	13.75
Normals	.53	.54	.34	.63	1.71	1.34	2.12	1.21	4.02	1.23	.50	.78	14.95

RAINFALL ON MEXICO SIDE OF RIO GRANDE WATERSHED

INCHES

continued

Saltillo, Coah.

Latitude 25.4° Longitude 101°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1913	1.77	.87	.11	.32	.53		1.04	3.24	4.50	2.03	1.02	.68	
1914	.23	.41	.63	.96					4.02	1.39	4.11	.50	
1919								1.34	2.52	1.04	.15		
1921	.02	.16	.02	.37	.98	2.40	2.81	.56	1.88	.07	.91	.07	10.25
1922	.00	.00		.41									
1923									2.49	1.65	1.04		
1926				1.74	.48	3.09	3.03	2.73	.77	.68			
1927	.00	.22											
1928	.92	1.27	.37	T	.20	.46	2.71	1.27	2.03	.04	.14	.85	10.26
1929	.14	.04	.07	.60	1.32	.14	2.12	1.15	.67	.91	2.07	.79	10.02
1930	.70	.31	.23	.33	1.97	2.17	2.82	1.18	1.58	3.99	2.50	1.09	18.87
1931	2.38	1.62	.63	.48	1.53	2.67	3.07	2.52	.46	1.07	.02	1.72	18.17
1932	.25	.24	.28	.29	.13	.57	3.12	.53	2.71	.26	.10	.06	8.54
1933	.45	1.03	.17	.02	.24	1.23	1.96	2.68	4.11	.20	.28	T	12.37
1934	.94	.27	T	2.54	1.21	4.14	3.19	.41	1.39	1.03	T	.25	15.37
1935	.41	1.01	.26	.93	1.12	2.50	3.01	1.09	6.22	.16	.16	.69	17.56
1936	.08	T	.22	1.03	3.30	.24	2.81	1.94	4.07	.12	.74	.83	15.38
1937	.85	.39	.32	1.04	.91	2.27	1.86	1.19	4.12	.44	T		
Normals	.61	.52	.25	.74	1.07	1.82	2.58	1.58	2.65	1.04	.94	.59	14.39

Ramos Arizpe, Coah.

Latitude 25.5° Longitude 100.9°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926											.04	.02	
1927	T	.30					1.22	.94	.28	.00	.00	.24	
1928	1.85	.98	.91	.06	.16	.33	.91	.31	3.15	T	.51	.79	9.96
1929	.08	T	.08	.04	.43	T	1.02	.12	1.14	.39	1.89	.16	5.35
1930	.35	.35	.20	.83	1.50	1.14	1.42	.51	.20	3.58	2.32	1.06	13.46
1931	2.05	1.10	.43	.43	1.48	.87	2.80	.31	.20	.33	.01	1.54	11.55
1932	.09	.33	.12	.28	.35	.98	1.77	.83	2.43	.21	.14	T	7.53
1933	.02	1.49	.54	.06	.17	.41	2.11	2.80	5.02	1.42	T	.21	14.25
1934	.78	.14	T	1.42	3.10	1.42	2.31	.43	.56	.35	.00	.13	10.64
1935	.50	.93	.64	.07	.40	3.17	2.71	.14	3.16	T	.05	.57	12.34
1936	.04	.00	.22	.20	3.03	.58	1.89	.53	2.61	.05	.64	1.00	10.79
1937	1.07	.67	.20	T	1.89	1.38	1.09	1.71	2.47	.20	.00	2.11	12.79
Normals	.62	.57	.33	.34	1.25	1.03	1.75	.78	1.93	.59	.47	.65	10.31

Monterrey, N. L.

Latitude 25.7° Longitude 100.3°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1896	.20	1.24	.24	.87	.76	2.64	6.30	1.26	3.76	6.24	1.18	.04	24.73
1897	1.44	.00	.07	.98	3.18	.12	.48	5.76	5.40	1.19	3.22	.23	22.07
1898	.00	.98	1.72	1.40	.26	2.22	1.24	2.06	4.42	.36	1.28	.54	16.48
1899	.16	.04	1.87	1.16	.24	8.99	.83	.00	2.02	8.91	1.10	.95	26.27
1900	3.15	.59	4.40			.81		1.43	2.69				
1901							2.78	.75	9.70	3.28	1.36	.00	
1902	.75	.55	.00	2.01	.47	.44	.82	.04	4.05	1.83	.64	2.03	13.63
1903	1.36	.03	2.65	.04	.93	4.25	3.83	5.39	2.71	2.81	.22	.64	24.86
1904	.00	.23	.00	.95	2.24	.44	.67	.44	11.15	.12	2.35	.35	18.94
1905	.45	1.83	.41	.19	.59	2.81	1.63	.18	3.39	7.20	6.20	1.36	26.24
1906	.05	2.71	.42	4.24	1.35	.10	2.69	5.59	7.20	1.47	1.02	2.04	28.88
1907	.41	1.45	.03	.85	1.19	6.88	1.00	.21	2.76	6.92	1.09	.04	22.83
1908	.54	.06	.80	2.90	.99	1.18	1.73	1.40	1.13	.20	.80	1.86	13.59
1909	.09	.35	.02	1.12	.80	.20	4.91	29.34	2.00	.30	.64	.71	40.48
1910	.70	.28	1.65	.14	1.18	.34	2.18	4.58	14.26	2.14	.09	1.99	29.53
1911	.31	.90	2.93	3.79	3.52	.03	1.34	.11	.68	4.40	3.88	1.04	22.93
1912	.59	.21	.62	3.07	1.23	6.44	.36	1.08	.80	2.50	2.76	.46	20.17
1913	1.04	.37	1.04	1.14	1.11	9.98	4.19	.53	5.05	4.41	1.00	.47	30.33
1914	.20	.60	.88	2.09	6.08	.31	.00	1.28	2.52	.94	5.54	.48	20.92
1915	.33	.05	.55	.00	.17	.00	.64	3.24	8.84	1.84	.06	.93	16.65
1916	.27	.38	.01	.13	1.66	.94	6.50	1.40	6.07	1.40	.13	.00	18.89
1917	.10	.05	.22	.22	.94	.41	.55	1.87	4.05	.20	.92	.02	9.55
1918	.00	.04	.05	1.00	1.00	4.09	.68	.42	1.32	3.53	2.22	.75	15.10
1919	2.35	.40	.58	.71	.38	4.30	6.23	.02	9.11	2.62	1.96	.74	29.40
1920	.55	.28	.45	.16	2.78	.69	1.73	.69	3.38	.95	1.24	.04	12.94
1921	.12	.28	.58	1.02	.68	.64	8.20	.50	1.01	5.05	.23	.00	18.31
1922	.02	.35	.00	.82	2.57	8.33	1.02	.89	8.77	2.28	2.28	.11	27.44
1923	.31	5.48	1.91	1.37	1.97	.71	1.00	.73	17.25	2.30	2.57	2.34	37.94
1924	.46	1.16	.14	1.25	2.28	1.55	.24	1.76	6.68	8.25	.22	1.32	25.29
1925	.12	T	.24	2.85	.37	1.52	.11	3.45	2.64	4.78	1.01	1.59	18.68
1926	.71	.08	1.03	2.92	.42	8.93	5.38	1.70	2.01	4.18	.27	.48	28.11
1927	.83	.40	.05	.48	.41	14.12	4.69	.92	5.75	2.40	.09	1.03	31.17
1928	1.35	1.49	.46	.37	4.01	1.89	.59	.84	7.64	.65	2.04	1.02	22.35
1929	.42	.50	1.36	.35	.34	.28	1.07	2.37	10.11	2.35	1.10	.39	20.64
1930	.46	.31	.33	.71	3.05	2.85	1.44	1.15	3.09	14.07	1.29	.40	29.15
1931	4.08	1.22	.99	1.35	3.45	.56	3.54	2.89	1.04	1.32	.43	1.36	22.23
1932	.70	.07	.18	.39	1.06	.22	1.52	2.52	21.22	6.22	.68	.26	35.04
1933	.59	1.34	.90	.11	.17	5.03	5.44	14.81	15.53	6.96	.52	.23	51.63
1934	.97	.21	.13	2.80	2.33	.39	6.10	1.14	9.94	.52	.95	.35	25.83
1935	1.66	.75	.58	.15	1.72	2.94	2.70	1.29	8.20	4.23	1.41	3.10	28.73
1936	.38	.04	.15	.30	3.74	.37	5.62	4.72	5.67	1.34	3.29	.72	26.34
1937	1.01	.93	1.18		2.05	.28	1.80	1.48	2.72	3.76	2.46	2.97	
Normals	.71	.69	.78	1.19	1.59	2.66	2.53	2.67	5.90	3.33	1.51	.86	24.42

Rayones, N. L.

Latitude 25° Longitude 100.1°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926										2.10		.11	
1927	T	T	T	.40	.03	7.53	1.04	1.11	.88	.52	1.26	.30	13.07
1928	.42	1.37	.58	.02	1.15	.61	1.46	2.69	7.85	.52	.81	.16	17.64
1929	.14	T	.06	.04	.55	3.46	1.06	1.99	4.27	1.16	1.34	.04	14.11
1930	.59	.69	.22	.43	2.58	1.56	.49	2.48	1.71	12.83	1.68	.47	25.73
1931	4.17	2.50	.16	1.18	2.68	T	2.05	1.75	1.54	.14	.02	.16	16.35
1932	.12	.06	.26	.37									
1937									3.89			.79	
Average	.91	.77	.21	.41	1.40	2.63	1.22	2.00	3.36	2.88	1.02	.29	17.10

Villa de Santiago, N. L.

Latitude 25.4° Longitude 100.2°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1923	.65	5.39	1.86	1.46	2.14	2.75	.58	4.34	21.12	4.09	3.19	2.16	49.73
1924	.85	1.69	.24	2.50	3.41	3.26	2.16	1.95	11.97	2.73	.67	1.03	32.46
1925	.30	.04	.67	2.63	1.37	6.90	.11	12.01	4.65	4.41	1.62	3.02	37.73
1926	.78	.24	1.63	3.38	2.24	7.99	8.39	4.72	5.52	3.91	.83	.72	40.34
1927	.22	1.14	.04	1.64	.67	11.75	3.71	3.13	5.98	2.25	2.61	.73	33.87
1928	1.41	1.67	.64	.02	5.57	1.06	4.26	.65	19.30	4.72	2.64	.96	42.90
1929	.13	2.21	3.62	.47	1.31	3.83	4.39	2.11	11.54	2.41	1.31	.15	33.48
1930	.54	.50	.17	.51	13.09	13.13	2.83	1.13	2.63	26.30	1.67	.63	63.13
1931	5.23	1.28	1.60	1.45	6.40	1.60	7.39	5.53	2.96	3.44	.40	1.94	39.22
1932	.98	.11	.26	1.23	2.17	2.04	2.40	5.37	18.98	3.74	.39	.00	37.67
1932	.00	.59											
1937				.05		2.33	7.10	1.99	7.11	2.56	5.51	2.98	
Normals	1.01	1.35	1.07	1.39	3.84	5.15	3.94	3.90	10.16	5.51	1.89	1.30	40.51

Montemorelos, N. L.

Latitude 25.2° Longitude 99.8°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926								.06	2.32	3.23	.00	T	
1927	T	.79	.00	1.11	.55	9.29	T	.39	.18	1.02	T	.59	13.92
1928	T	.08	.14	.08	5.51	T	.00	.06	5.51	.06	1.81	.81	14.06
1929	1.38	.10	1.38	1.57	1.99	2.05	.49	2.17	3.09	1.81	1.99	.39	18.41
1930	.39	.61	1.38	.79	5.12	1.65	.59	.79					
1937							5.30	2.85	1.19	3.26	2.50	2.38	
Average	.44	.40	.72	.89	3.29	3.25	1.28	1.05	2.46	1.88	1.26	.83	17.75

Cadereyta, N. L.

Latitude 25.6° Longitude 100°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926												.46	
1927	.49	1.11	.05	.77	.47	26.02	7.05	1.70	1.36	.95	.00	1.68	41.65
1928	.87	1.67	.81	.48	2.50	.35	2.16	.43	8.00	1.50	3.17	.82	22.76
1929	.25	.48	3.24	1.22	2.18	.24	1.30	2.84	6.79	5.47	1.35	.13	25.49
1930	.28	.12	.17	1.66	7.13	7.73	2.06	1.61	4.77	9.75	2.01	.21	37.50
1931	4.91	1.15	.57	1.78	4.23	.32	5.50	7.75	2.52	1.12	.53	1.49	31.87
1937							8.17	2.56	1.10	4.30	1.97	1.83	
Average	1.36	.91	.97	1.18	3.30	6.93	4.37	2.82	4.09	3.85	1.50	.95	32.23

Las Enramadas, N. L.

Latitude 25.5° Longitude 99.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926									5.85		.20	.71	
1927	.26	.28	.00	1.23	.47	13.39	2.75	.12	1.75	.33	.10	1.47	22.15
1928	1.89	1.66	.12	.28	3.88	.84	.52	.39	8.32	.15	.85	.31	19.21
1929	.02	.20	1.17	1.69	2.48	.71	1.69	2.80	3.69	1.34	.89	.77	17.45
1930	.43	.15	.48	1.48	5.81	4.65	.85	1.54	.87	6.09	2.21	.20	24.76
1931	5.92	.78	1.25	.59	5.80	1.58	9.39	1.28	2.19	.65	.28	.56	30.27
1932	.40	.18	.24	1.18	1.51	2.13	3.74	4.92	20.75	1.30	.28	.20	36.83
1933	.06	1.13	1.10	1.32	3.36	.44	4.48	12.30	14.11	3.15	1.34	.25	43.04
1934	2.12	.45	.06	3.78	3.52	1.17	3.17	2.79	2.87	1.67	.00	.18	21.78
1935	.33	.85	.51	1.30	8.70	4.22	3.31	1.38	5.46	1.30	2.82	2.53	32.71
1936	.18	.18	.89	.43	3.96	.97	5.61	7.89	2.00	.48	1.16	.62	24.37
1937	1.24	.76	1.59	T	3.23	2.34	5.81	1.56	.64	1.26	1.39	3.80	23.62
Normals	1.17	.60	.67	1.21	3.88	2.95	3.76	3.36	5.71	1.61	.96	.97	26.85

Higueras, N. L.

Latitude 26° Longitude 100°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926												.58	
1927	.79	.22	.08	.78	.43	7.87	3.03	.99	2.11	.49	.18	2.15	19.12
1928	2.14	1.81	.31	.04	1.74	2.16	1.37	2.05	9.88	1.97	2.08	.86	26.41
1929	.47	.06	.59	.93	.37	.35	1.68	1.54	5.48	.93	.91	.22	13.53
1930	.25	.12	.50	.61	5.44	5.20	2.33	2.44	.81	7.22	2.08	.37	27.37
1931	3.89	.99	.44	1.59	1.76	.71	5.27	3.54	1.91	1.02	.73	1.57	23.42
1932	.53	.28	.57	.49	.31	2.93	2.78	4.24	12.36	2.83	.79	.30	28.41
1933	.28	1.65	.30	.28	.32	2.60	2.01	10.07	12.44	1.85	2.35	.35	34.50
1934	1.43	.63	.18	3.89	3.83	.45	5.00	1.46	4.32	1.99	.98	.39	24.55
1935	1.65	.98	.10	2.03	1.56	1.15	3.09	.93	7.69	.33	1.82	2.97	24.30
1936	.29	.17	.81	.16	4.82	1.65	4.05	3.33	6.53	.71	1.30	.83	24.65
1937	.80	.91	1.44	.10	2.84	.30	1.58	.79	1.93	1.36	.24	2.60	14.89
Normals	1.14	.71	.48	.99	2.13	2.31	2.93	2.85	5.95	1.88	1.22	1.10	23.69

Gral. Bravo, N. L.

Latitude 25.7° Longitude 99.2°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1926												1.44	
1927	.08	.39	.06	3.20	1.34	16.70	2.19	T	3.86	1.04	T	1.80	30.66
1928	1.39	2.41	T	.50	2.78	.00	1.72	2.18	11.14	.46	.33	1.27	24.18
1929	.29	T	1.50	.79	1.69	3.44	14.73	.26	3.93	1.62	.94		
1930	T	.08	.33	.00	10.26	3.80	T	.94	1.27	4.25	4.02	.02	24.97
1931	6.70	.09	.82	.28	.31	.17	.46	.26	.07	T	T	.10	9.26
1932	.31	T	T	.08	.18	.19	.00	4.81	8.01	1.35	.03	T	14.96
1933	T	1.38	T	.49	3.35	1.06	3.11	4.48	9.33	1.50	.39	T	25.09
1934	1.04	T	.00	2.80	7.28	.00	3.62	2.36	1.14	.40	T	.02	18.66
1935	.43	.71	.39	1.42	4.49	3.07	5.83	.71	6.97	.98	.94	2.60	28.54
1936	T	T	2.36	.75	6.69	.00	.43	4.88	T	T	.79	1.02	16.92
1937	.79	T	.63	T	.31	1.97	3.57	T	.91	2.40	T	4.29	14.87
Normals	1.00	.46	.55	.94	3.52	2.76	3.24	1.90	4.24	1.27	.68	1.14	21.70

Sta. Rosalia, Tamps.

Latitude 26.2° Longitude 99°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1929	.67	.08	1.10	.33	.12	2.15	4.42	.73	.48	2.38	1.39	.96	14.81
1930	.19	.41	1.09	.72	5.81	2.62	.42	.85	3.50	2.84	3.72	.30	22.47
1931	3.79	.49	1.32	.00	2.49	2.77	4.42	2.73	1.24	.70	.54	1.07	21.56
1932	.53	.32	.58	2.78	1.60	1.39	1.64	3.30	8.54	1.94	.00	.50	23.12
1933	.09	.77	.50	1.35	2.74	2.23	3.58	7.85		1.16	2.39	.22	
1934	1.33	.33	.07	1.76	1.34	1.33	2.86	.51	.88	1.35	.00	.66	12.42
1935		.64	.13	.53	3.24	4.12	1.03	.04	4.54	1.58	1.52	1.86	
1936	.18	.68	.39	.72	1.27	.00	4.11	3.06	.73	.69	.09	1.71	13.63
1937	.76	.55	.80	.06		T	1.91	T	2.33		.00	2.20	
Average	.94	.47	.66	.92	2.33	1.85	2.71	2.12	2.78	1.58	1.07	1.05	18.48

Matamoros, Tamps.

Latitude 25.8° Longitude 97.5°

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1913	1.97	.53	1.89										
1916										1.70	.61	1.44	
1917	.17	.30	1.28	.64	2.25	.54	5.98	.44	1.61	.24	.05	.27	13.77
1918	.00	.43	.81	2.71	4.23	1.12	1.94	.64	1.30	3.73	2.34	3.38	22.63
1919	3.52	.76	.39	2.22	1.42	4.64	7.65	.05	6.13	4.00	2.53	.73	34.04
1920	1.00	.50	.65	.02	3.28	3.80	1.34	.01	.17	5.45	2.86	.03	19.11
1921	1.79	.50	.78	2.81	.03	4.33	3.43	.16	2.95	1.13	1.04	.23	19.18
1922	.94	3.09	.90	1.19	2.76	3.82	1.92	1.14	9.81	.46	2.94	.39	29.36
1923	.18	5.99	1.37	.34	.45	1.41	2.12	.62	5.04	4.63	2.79	2.60	27.54
1924	3.78	.78	.07	.08	3.07		.61	.22	7.50	4.23	.02	3.26	
1925	.43	T	3.06	1.20	3.52	4.06	.01	2.18	21.13	3.51	1.14	3.66	43.90
1926	3.93	.04	1.67	2.22	3.52	2.97	4.52	1.26	3.85	3.06	.23	5.65	32.92
1927	1.76	.45	.15	.65	.55	6.82	2.37	.77	5.04	2.32	1.72	2.41	25.01
1928	1.23	1.60	.17	.96	6.57	3.22	.29	.43	8.34	2.61	4.96	1.59	31.97
1929	.54	.33	.30	1.69	9.15	1.83	4.51	.80	6.17	.70	2.18	.82	29.02
1930	.59	.93	1.27	3.00	4.33	3.85	.96	.56	2.60	9.87	6.08	.49	34.53
1931	4.71	.60	1.39	.74	.81	.91	3.62	2.28	1.44	2.34	1.15	1.89	21.88
1932	1.55	1.97	2.61	6.51	.84	3.70	.18	2.57	7.48	6.43	.54	.73	35.11
1933	.17	.91	.35	.55	5.44	.36	4.53	9.83	5.80	3.25	2.06	.14	33.39
1935	.86	.20	.84	2.02	1.44	6.26	1.09	2.44	5.37	1.61	.51	2.56	25.20
1936	.26	1.54	.54	3.15	3.45	.81	4.30	6.65	8.42	.73	.44	2.61	32.90
1937	1.96	1.27	.79	.71	6.17	.03	4.01	2.46	2.17	.80	1.61	6.12	28.10
Normals	1.49	1.08	1.01	1.67	3.16	2.87	2.77	1.78	5.62	2.99	1.80	1.95	28.19

EVAPORATION FROM FREE WATER SURFACES IN THE RIO GRANDE BASIN

Four types of pans are used for determining evaporation from free water surfaces in the Rio Grande basin below San Marcial, New Mexico. The results reported below are inches evaporation from such pans.

1. Circular land pan 4 feet in diameter and 10 inches deep, made of 22 gage galvanized iron, set on wooden platform on top of ground. Water in pan kept at about 7 to 8 inches depth. Measurements by micrometer hook gage. This type of pan was used at Elephant Butte, State College, Dilley and all Mexican stations.

2. Circular land pan 6 feet in diameter and 2 feet deep, made of 20 gage galvanized iron, set with top of pan 4 inches above ground. Water in pan kept at about 16 to 18 inches deep. Measurements by micrometer hook gage. This type of pan was used at Balmorhea and Weslaco.

3. Circular land pan 10 feet in diameter and 22 inches deep, set with the top edge of the pan about 1-1/2 inches above ground. Water in the pan is kept about 17 inches deep. Measurements by micrometer hook gage. This type of pan is used at Winterhaven.

4. Thirty-six inch square floating pan 18 inches deep kept filled to about 15 inches deep. Made of 20 gage galvanized iron with metal floats of the same material at each end. The top of the pan is kept about 3 inches above the water outside the pan. The pan floats in a metal water tank 5 feet deep and about 45 feet in diameter which is kept full within a few inches of the top. Measurement by fixed point gage in center of pan and a dipper of known volume for refilling the pan up to the gage point. This type of pan was used at Jornada, New Mexico.

The United States Weather Bureau furnished the records for Elephant Butte, Jornada, Mesilla Park, Dilley and Balmorhea. From Texas A. & M. College comes records for Winterhaven and Weslaco. Records for all Mexican stations are from the Meteorological Service of Mexico.

	Elephant Butte Dam, N. M.		Jornada, N. M.		State College, N. M.		Balmorhea, Texas	
	1937	Normal 1924 to 1937	1937	Average 1929 to 1937	1937	Normal 1924 to 1937	1937	Normal 1926 to 1937
Jan.	4.38	2.77	2.95	2.91	3.40	2.98	2.04	2.61
Feb.	4.74	4.25	4.00	4.18	4.48	4.42	3.14	3.59
March	7.82	7.51	6.70	7.54	6.49	7.51	4.30	5.34
April	14.02	10.10	10.95	9.83	10.85	9.59	6.79	6.47
May	15.50	12.27	12.13	12.25	11.31	11.27	7.05	7.47
June	16.77	14.24	12.34	12.95	13.17	12.50	8.44	8.20
July	15.77	12.49	12.71	11.82	12.98	11.54	8.69	7.94
August	14.04	10.76	10.97	9.98	11.02	9.88	7.30	7.06
Sept.	9.81	8.69	10.33	8.68	8.38	7.99	5.17	5.40
Oct.	7.56	6.74	5.97	6.51	6.53	5.99	3.88	4.26
Nov.	5.78	4.16	4.19	3.97	4.38	3.84	2.92	3.00
Dec.	3.00	2.55	2.69	2.43	2.64	2.58	1.50	2.08
Yearly	119.19	96.53	95.93	93.05	95.63	90.09	61.22	63.42

	Winterhaven, Texas		Palestina, Coah.		Dilley, Texas		El Nogal, Coah.		Don Martin, Coah.	
	1937	Average 1931 to 1937	1937	Average 1935 to 1937	1937	Normal 1928 to 1937	1937	† Average 1935 to 1937	1937	† Normal 1927 to 1937
Jan.	1.55	1.84	3.46	4.84	1.68	2.67	3.07	3.65	3.45	2.95
Feb.	3.00	2.67	4.62	5.01	3.64	3.53	5.94	5.61	5.46	4.31
March	3.58	4.79	7.84	8.36	4.31	6.01	7.45	8.55	6.49	7.45
April	6.42	5.70	9.67	9.55	7.89	7.25	11.52	10.87	11.18	9.06
May	7.08	6.49	10.24	10.54	9.45	8.06	11.82	10.75	11.85	10.32
June	8.30	7.97	10.41	11.01	10.38	9.60	*	10.48	13.25	13.27
July	8.45	8.29	12.21	11.50	9.93	10.33	*	8.84	12.68	13.37
August	9.71	8.48	13.52	12.67	11.63	10.47	*	12.01	15.09	13.65
Sept.	6.76	6.03	9.98	8.80	7.80	7.26	*	7.88	9.76	9.34
Oct.	5.05	4.69	9.69	8.17	6.62	5.75	*	6.08	7.50	7.00
Nov.	3.00	3.03	8.63	7.03	3.93	3.43	*	3.28	5.01	4.61
Dec.	1.24	1.75	7.34	6.11	1.55	2.42	*	2.70	2.52	2.91
Yearly	64.14	61.73	107.61	103.59	78.81	76.78		90.70	104.24	98.24

	San Buenaventura, Chih.		Cd. Anahuac, N. L.		Santa Rosalia, Tamps.		Linares, N. L.		Weslaco, Texas	
	1937	† Normal 1928 to 1937	1937	†Average 1933 to 1937	1937	†Normal 1924 to 1937	1937	Average 1935 to 1937	1937	Average 1932 to 1937
Jan.	4.12	3.86	2.56	2.06	3.90	3.20	2.13	2.76	1.97	2.51
Feb.	4.11	4.75	3.76	2.89	4.04	4.56	3.72	3.68	2.64	2.94
March	6.83	7.27	4.76	4.96	5.24	6.65	3.97	5.20	2.98	4.46
April	*	9.11	9.10	6.38	9.07	8.26	5.89	5.78	5.58	5.46
May	10.22	10.66	10.06	6.91	*	10.50	6.35	6.15	6.29	5.99
June	10.98	11.11	11.96	10.78	13.63	10.88	8.75	7.56	7.49	6.93
July	9.84	8.98	11.17	10.58	13.19	11.50	6.87	6.72	6.44	6.29
August	9.20	7.44	12.81	10.85	12.72	11.54	8.68	7.44	7.62	6.88
Sept.	6.17	6.92	8.90	7.07	6.59	7.14	5.76	5.22	5.94	4.37
Oct.	5.91	5.96	5.99	5.12	*	6.96	4.60	4.38	4.79	4.63
Nov.	4.96	4.16	3.11	3.38	3.76	3.92	2.70	2.73	3.44	3.31
Dec.	*	3.17	1.44	2.19	*	3.20	1.89	2.02	1.93	2.30
Yearly		83.39	85.62	73.17		88.31	61.31	59.64	57.11	56.07

* No Record Available

† Some months' records are missing, see previous Water Bulletins

DIVERSIONS FROM THE RIO GRANDE
IN HIDALGO AND CAMERON COUNTIES, TEXAS
Together With Corresponding
ACREAGE CULTIVATED, WATER DUTY AND RAINFALL
1922 to 1937

The cultivated areas shown here are supplied with irrigation facilities. The acreage actually irrigated has varied approximately from 97% of the cultivated area in 1929, to 73% of the cultivated area in 1933, depending upon favorable rainfall and other conditions. The average annual evaporation from natural water surfaces in these counties is approximately 55 inches per year. (See Water Bulletin No. 5, Page 58).

	1922	1923	1924	1925	1926	1927
Acre Feet Diverted from the Rio Grande						
January	59,200	71,000	25,100	36,800	7,690	53,300
February	114,000	68,500	48,100	134,000	44,900	69,600
March	101,000	23,900	85,000	126,000	43,600	156,000
April	57,500	35,500	119,000	68,000	46,700	98,000
May	35,400	135,000	40,400	112,000	34,900	96,200
June	28,100	71,000	27,800	75,200	45,600	59,300
July	48,900	51,400	64,200	86,400	20,800	21,200
August	56,200	63,600	80,100	54,400	59,500	98,000
September	21,600	30,000	44,600	16,800	60,000	59,300
October	21,400	25,100	55,200	36,000	65,200	57,600
November	11,500	26,300	71,100	39,200	49,200	61,800
December	19,500	10,400	36,300	14,400	35,400	30,100
Total Diverted - Acre Feet	574,300	611,700	696,900	799,200	513,490	860,400
Average Acreage Cultivated	216,000	237,000	268,000	298,000	327,000	343,000
Mean Acre Feet per Acre	2.66	2.58	2.60	2.68	1.57	2.51
Average Rainfall in Inches	31.93	31.98	24.95	25.61	27.22	18.40

	1928	1929	1930	1931	1932	1933
Acre Feet Diverted from the Rio Grande						
January	53,000	57,300	29,000	30,500	27,500	40,100
February	72,000	128,000	49,000	6,950	73,400	38,100
March	145,000	112,000	77,000	33,500	52,000	83,100
April	102,000	52,700	30,000	33,000	48,300	78,700
May	31,600	93,200	4,500	36,400	31,800	92,300
June	60,100	39,000	1,500	64,700	83,600	22,300
July	103,000	62,600	10,000	33,000	36,700	25,000
August	85,400	84,000	45,000	42,100	77,800	19,100
September	20,600	44,300	110,000	52,600	43,800	8,010
October	56,200	45,800	75,000	69,100	42,800	28,500
November	35,600	24,400	25,000	50,300	56,500	32,800
December	26,900	21,400	44,000	32,600	33,100	48,300
Total Diverted - Acre Feet	791,400	764,700	500,000	484,750	607,300	516,310
Average Acreage Cultivated	354,000	370,000	388,000	335,000	353,000	323,000
Mean Acre Feet per Acre	2.24	2.07	1.29	1.45	1.72	1.60
Average Rainfall in Inches	27.02	24.46	30.58	23.30	28.67	41.55

	1934	1935	1936	1937	Total 1922 to 1937	Normal 1922 to 1937
Acre Feet Diverted from the Rio Grande						
January	28,300	40,300	30,700	21,400	611,190	38,199
February	19,500	49,700	36,300	26,400	978,450	61,153
March	50,400	99,100	81,800	52,500	1,321,900	82,619
April	65,700	65,200	70,600	87,400	1,058,300	66,144
May	79,600	35,500	31,800	42,600	933,200	58,325
June	81,100	21,700	81,800	84,600	847,400	52,962
July	31,800	44,400	43,600	33,100	716,100	44,756
August	44,400	56,600	60,800	71,400	998,400	62,400
September	29,800	39,600	22,000	83,900	686,910	42,932
October	57,300	41,100	41,600	70,900	788,800	49,300
November	59,700	33,000	36,600	63,300	676,300	42,269
December	34,800	23,500	28,700	15,800	455,200	28,450
Total Diverted - Acre Feet	582,400	549,700	566,300	653,300	10,072,150	629,509
Average Acreage Cultivated	294,000	327,000	358,000	321,000	5,112,000	319,500
Mean Acre Feet per Acre	1.98	1.68	1.58	2.04		1.97
Average Rainfall in Inches	21.94	30.07	30.10	24.91	442.69	27.67