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WATER BULLETIN NUMBER 19

Flow of the Rio Grande
and
Tributary Contributions

*From San Marcial, New Mexico
to the Gulf of Mexico*

1949

WITH MAXIMUMS, MINIMUMS AND NORMALS

STORAGE CAPACITIES AND WATER IN STORAGE

SOURCES OF RIVER FLOW

DIVERSIONS

SILT, CHEMICAL AND SANITARY ASPECTS OF WATER QUALITY

RAINFALL AND EVAPORATION

DRAINAGE BASIN AND IRRIGATED AREAS

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FOREWORD

This bulletin presents the 19th compilation of stream discharges and hydrologic data relative to the international portion of the Rio Grande, prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission. The stream flow data and kindred subjects pertain to the Rio Grande and its important tributaries near their confluence with the main stream from San Marcial, New Mexico to the Gulf of Mexico. The first publication in the series was Water Bulletin No. 1 for the year 1931. The present volume contains the information for the year 1949.

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

During 1949 the United States Section of the Commission operated the stream gaging stations on the Rio Grande at El Paso, American Dam, Island, County Line, Fort Quitman, Upper Presidio, Lower Presidio, Johnson Ranch, Langtry, Del Rio, Zapata, Rio Grande City, Hidalgo, and Lower Brownsville. The Mexican Section operated the stream gaging stations on the main stream at Juárez, Eagle Pass, Laredo, Roma, Las Palmas, and Matamoros. Each Section operated the gaging stations on tributary streams within its own country and those on floodways and diversions within its borders.

The total drainage area within the outer rim of the Rio Grande Basin is 335,500 square miles. However, nearly half of this area yields no run-off to the river, the productive area of the watershed being estimated as 171,900 square miles. It is estimated that the average annual virgin yield from this area was 9,062,000 acre-feet. Approximately 8,300,000 acre-feet of storage has been provided. A present total of 2,600,000 acres are irrigated. The residual flow from the Rio Grande that escaped to the Gulf of Mexico averaged 3,100,000 acre-feet per year for the period 1934-1949.

While the data presented herein pertain primarily to the year 1949, similar information for earlier years is available in the previous reports of this same series. A list of the stream flow records pertinent to the Rio Grande and its tributaries from San Marcial, New Mexico to the Gulf of Mexico can be found in Water Bulletin No. 16 for the year 1946.

Acknowledgments

Other agencies which have each contributed to some part of the data published herein include: the Bureau of Plant Industry, Division of Soils and Agricultural Engineering, and the Soil Conservation Service of the U.S. Department of Agriculture; The Bureau of Reclamation and the Geological Survey of the U.S. Department of the Interior; the Weather Bureau of the U.S. Department of Commerce; the Corps of Engineers of the U.S. Army; the Agricultural and Mechanical College of Texas; Texas Board of Health; New Mexico State Engineer; El Paso City-County Health Unit; El Paso Department of Water and Sewerage; Laredo City Water Department; Red Bluff Water Power Control District; Ministry of Hydraulic Resources of Mexico; Mexican Department of Agriculture and Livestock; Meteorological Service of Mexico; Cía. Agrícola y de Fuerza Eléctrica del Río Conchos, S.A., and Federal Board of Public Improvement Works of Nuevo Laredo, Tamaulipas.

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

General Hydrologic Conditions for 1949
Along and Adjacent to The International Portion of the Rio Grande

Mean annual temperatures averaged about normal on the effective watershed and in the Lower Rio Grande Valley. Evaporation was about 93% of normal on the effective watershed. Rainfall was about 125% of normal on the effective watershed and about 89% in the Lower Valley. The average monthly amounts of water in storage were about 74% of normal on the United States side and about normal on the Mexican side.

The volume of yearly flow of the Rio Grande was below normal above Río San Diego and also below Río San Juan. It varied from 750,000 acre-feet below normal at Matamoros to lesser amounts elsewhere. From the Río San Diego to the Río San Juan the Rio Grande flow was above normal, reaching 375,000 acre-feet above normal at Roma. During the year 2,522,500 acre-feet of water, in addition to that which flowed through the floodways and levee breaks was discharged to the Gulf of Mexico.

The annual flow of the measured Mexican tributaries, exclusive of the Río San Juan, was 1,369,000 acre-feet, or 75.4% of normal and varied from 65% for the Río Conchos to 169% for the Río San Diego. The annual flow of the measured tributaries in the United States was 1,151,000 acre-feet, or 115% of normal with Alamito Creek flowing 45% of normal while San Felipe Creek contributed 164% of its normal.

There were two small floods in 1949. The first was from unseasonable rains in the Devils River-Eagle Pass area. The maximum discharge of this flood was 102,000 second-feet at Del Rio Station on the 25th of February, 82,280 second-feet at Eagle Pass on the 26th of February, 60,200 second-feet at Rio Grande City Station on February 28, and 24,900 second-feet at Lower Brownsville on March 2. There was no flow in any of the floodways below Rio Grande City from this flood.

The second flood was from the basin below Eagle Pass and below the Carranza and Gómez reservoirs on the Salado and San Juan rivers, respectively, in Mexico. The peak discharges were 24,120 second-feet on April 25 at Laredo, 26,240 second-feet on April 23 from the Río Salado, 94,100 second-feet on April 25 at Zapata Station, 14,160 second-feet from the Río Alamo on the 25th of April, 98,530 second-feet at Roma and 79,500 second-feet at Rio Grande City on April 26, and 32,950 second-feet on April 30 at Matamoros.

The shortage of irrigation water in the Lower Rio Grande Valley was not very great. It lasted only a few days in January and in June. Despite these shortages the annual volume of water diverted for irrigation on the United States side below Rio Grande City was 126% of normal for the period 1938 to 1949. The annual water diversions for irrigation under the Maverick Canal Extension below the power plant was 125% of normal. Municipal diversions on both sides averaged 135% of normal.

There was an increase of 25,318 acres in the irrigated area on the U.S. side below Roma. On the Mexican side the increase below Roma was 84,757 acres. In 1949 106,255 acres were irrigated under the Marte Gómez Reservoir on the Río San Juan and 93,653 acres were irrigated from the Rio Grande on the Mexican side below Reynosa.

The 1949 sanitary sampling and assaying program of Rio Grande water extended from above El Paso to Mercedes. The annual tonnage of salts, or total dissolved solids, carried by the river was below normal. The quantity of suspended silt passing down the Rio Grande was in general above normal. At Langtry it was 148%, at Eagle Pass 116%, and at Roma 102% of normal.

RIO GRANDE AT SAN MARCIAL, NEW MEXICO

DESCRIPTION: Water-stage recorder, cable with stand-up cable car and winch located at railroad bridge about one mile below San Marcial, New Mexico, and 177.1 miles above the American Dam at El Paso, Texas. The recorder is on the upstream end of the first bridge pier from the south abutment of the bridge with gage zero at 4,455.38 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: After July 1, 1946, the operation of this station was turned over to the U.S.G.S. which furnished the record. Records available: January 1895 to September 30, 1949. Records for the last three months of 1949 are not available.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. October 11, 1904, 50,000 second-feet with water-surface level of 4,459.5 feet above mean sea level, U.S.C. & G.S. datum, about .25 mile above the present gage. Min. sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	33,000	Oct. 11, 1904	Min.	sometimes dry
Monthly:	Max.	16,159	May 1941	Min.	sometimes dry
Yearly:	Max.	3,911	1941	Min.	277 1902

Mean Daily Discharge in Second-Feet 1949**—Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	710	* 494	2,250	1,530	2,220	3,890	5,900	542	24			
2	710	* 700	2,130	1,280	2,760	3,720	4,910	660	35			
3	* 613	* 900	2,250	1,520	3,170	3,330	4,440	898	68			
4	* 200	* 874	2,220	1,770	2,890	3,290	4,360	640	26			
5	* 150	795	1,970	1,830	2,420	3,290	3,690	568	39			
6	* 250	720	2,110	1,790	2,340	3,200	2,990	1,060	250			
7	* 320	730	2,020	1,390	2,490	2,850	2,570	526	478			
8	414	740	2,170	874	2,520	2,150	2,390	510	236			
9	534	670	2,170	568	2,790	2,200	2,080	784	160			
10	690	750	2,290	518	2,730	2,340	2,020	1,210	224			
11	1,050	604	2,250	559	2,250	2,490	2,550	1,550	946			
12	898	577	1,930	828	2,200	3,050	2,680	1,320	958			
13	850	577	1,870	806	3,820	3,890	3,140	640	510			
14	958	559	1,930	660	4,480	3,820	3,550	463	470			
15	910	586	2,020	510	4,110	3,390	3,390	250	478			
16	839	680	1,770	442	4,000	3,960	3,260	216	660			
17	910	784	1,590	839	4,110	4,070	2,200	245	586			
18	510	710	1,550	1,130	3,890	4,110	2,110	236	414			
19	534	1,420	1,500	1,360	3,790	4,360	1,850	154	305			
20	850	1,850	1,500	1,070	3,580	4,910	1,300	151	196			
21	795	1,970	1,470	1,180	3,390	5,810	1,140	180	192			
22	806	1,870	1,770	1,100	3,230	6,740	1,110	112	127			
23	604	2,000	1,710	1,080	3,550	7,720	1,890	130	117			
24	613	1,970	1,680	1,090	3,330	8,000	3,140	117	120			
25	680	1,870	1,570	1,210	2,550	8,600	4,360	92	70			
26	720	2,110	1,790	1,770	2,440	9,230	2,520	73	72			
27	670	2,250	1,550	1,870	2,550	8,600	1,750	79	53			
28	* 680	2,290	1,380	1,950	3,230	8,300	1,410	54	68			
29	* 500	1,270	2,170	3,230	7,720	874	53	52				
30	* 200	1,130	2,080	3,360	6,840	631	42	53				
31	* 428	1,410			3,820	534	27					
Sum		32,030	36,494	96,640	145,870	13,582						
19,596		56,220			80,739	7,987						

Month	Extreme Gage Feet			# Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1924-1949			Acre-Feet Normal 1938-1949
	High	Low	Day	High	Low			Normal	Maximum	Minimum	
	High	Low	Day								
Jan.			11	1,050	5	150	632	38,900	43,613	72,600	17,400 45,358
Feb.			28	2,290	1	494	1,140	63,500	47,397	77,100	29,600 46,725
Mar.			10	2,290	30	1,130	1,810	112,000	58,581	119,000	20,100 60,516
Apr.			29	2,170	16	442	1,220	72,400	116,627	432,000	3,940 96,132
May			14	4,480	12	2,200	3,120	192,000	267,301	994,000	4,450 273,191
June			26	9,230	8	2,150	4,860	289,000	164,552	609,000	" 32.7 190,578
July			1	5,900	31	534	2,600	160,000	56,260	246,000	0 62,480
Aug.			11	1,550	31	27	438	26,900	43,731	275,000	1,620 32,978
Sept.			12	958	1	24	266	15,800	45,739	308,000	1,430 29,167
Oct.											
Nov.											
Dec.											
Yearly											

* Estimated * Partly estimated # Mean daily ** Preliminary records subject to change by U. S. G. S.

RIO GRANDE BELOW ELEPHANT BUTTE DAM, NEW MEXICO

DESCRIPTION: Water-stage recorder 3,800 feet below dam and cable with sit-down cable car with winch 100 feet below recorder. Zero of gage is 4,242.09 feet above mean sea level, U.S.C. & G.S. datum. Elephant Butte Dam is 135.1 river miles above the American Dam at El Paso, Texas, and 42.0 river miles below the San Marcial gaging station at the upper end of Elephant Butte Reservoir.

RECORDS: The records for the first eleven months of 1949 were furnished by the El Paso office of the Bureau of Reclamation and are based on 84 current meter measurements during the period, a continuous record of gage heights and a stable rating curve. Records for the month of December (marked "subject to revision") were furnished by the Geological Survey. Records available: January 1915 to December 1949.

REMARKS: The station described here was operated by the Bureau of Reclamation prior to December 1, 1949 at which time operation was turned over to the Geological Survey. It has been the official station since 1931. Reservoirs, diversions, and drainage returns modify the river flow at this station. Beginning December 1940 hydroelectric power generation facilities for 27,000 kva were placed in operation.

COMPARATIVE FLOWS FROM RECORDS:

							Average Flow in Second-Feet				
Daily:	Max.	8,220	May 22, 1942				Min.		sometimes dry		
Monthly:	Max.	7,600	May 1942				Min.	3.0	Jan. 1930		
Yearly:	Max.	2,510		1942			Min.	771		1947	

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	87.0	550	1,450	1,350	1,830	1,820	1,470	1,350	988	517	1,000	939
2	91.0	530	1,460	1,340	1,810	1,870	1,390	1,250	871	556	1,010	937
3	483	484	1,470	1,350	1,840	1,870	1,170	1,180	899	810	1,000	823
4	541	490	1,420	1,350	1,810	1,530	1,180	1,030	802	782	1,010	685
5	601	500	1,310	1,350	1,680	1,350	1,440	1,040	877	770	774	915
6	763	557	548	1,350	1,600	1,740	1,580	923	1,060	790	701	964
7	739	511	1,390	1,350	1,360	1,920	1,600	733	1,030	911	1,140	952
8	557	552	1,580	1,350	1,040	1,880	1,620	888	1,000	758	984	936
9	230	385	1,380	1,330	1,390	1,840	1,300	990	912	625	950	910
10	780	418	1,360	1,340	1,610	1,860	993	1,050	885	849	964	775
11	612	588	1,560	1,360	1,680	1,880	1,210	1,040	774	891	965	648
12	575	572	1,630	1,360	1,720	1,360	1,330	978	983	830	931	834
13	683	276	1,210	1,340	1,620	1,710	1,290	863	949	962	807	1,020
14	525	611	1,570	1,340	1,730	1,860	1,330	718	932	953	986	971
15	462	850	1,580	1,360	1,320	1,970	1,290	793	1,040	792	999	841
16	277	867	1,840	1,340	1,640	1,830	1,330	1,120	845	708	1,010	952
17	598	716	1,840	1,340	1,790	1,730	1,050	1,200	733	892	1,010	865
18	603	761	1,840	1,330	1,840	1,700	1,430	1,210	572	879	975	674
19	671	610	1,830	1,340	1,930	1,400	1,460	1,140	872	869	780	1,010
20	621	204	1,490	1,320	1,880	1,720	1,640	940	924	898	648	932
21	506	464	1,600	1,490	1,890	1,730	1,520	787	1,000	853	909	1,030
22	535	533	1,840	1,820	1,720	1,560	1,290	997	946	760	823	1,010
23	177	654	1,870	1,820	1,790	1,440	1,260	1,180	972	530	1,010	1,040
24	562	735	1,910	1,620	1,940	1,520	1,000	1,080	805	795	732	806
25	713	667	1,880	1,870	1,740	1,570	1,270	1,080	648	910	1,000	645
26	647	592	1,850	1,960	1,650	1,350	1,420	1,220	866	940	866	802
27	563	260	2,020	1,960	1,760	1,680	1,530	848	912	838	700	938
28	558	824	1,430	1,970	1,910	1,780	1,500	889	676	1,260	948	958
29	601	1,330	1,930	1,720	1,860	1,860	1,500	1,270	927	1,030	941	988
30	316	1,320	1,860	1,550	1,630	1,260	1,130	1,230	803	868	940	918
31	634		1,340		1,740		1,240			1,070		761
Sum		15,761		45,190		50,860		32,147		25,896		27,479
16,311		48,048		52,530		41,893		26,503		27,513		

Month	Extreme Gage Feet			# Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1924-1949			Acre-Feet Normal 1938-1949	
	High		Low	Day	High			Day	Normal	Maximum		
	High	Low	Day	Day	Day	Day	Day	Day				
Jan.	10	780	1	87.0	526	32,400	24,248	86,500	184	49,363		
Feb.	16	867	20	204	563	31,300	37,434	76,300	969	46,875		
Mar.	27	2,020	6	548	1,550	95,300	63,874	95,300	1,520	61,985		
Apr.	28	1,970	20	1,320	1,510	89,600	103,692	162,000	57,200	93,475		
May	24	1,940	8	1,040	1,690	104,000	110,454	467,000	63,000	115,092		
June	7	1,920	5	1,350	1,700	101,000	116,912	363,000	64,400	111,892		
July	20	1,640	10	993	1,350	83,100	115,900	211,000	72,700	105,534		
Aug.	1	1,350	14	718	1,040	63,800	105,450	161,000	63,800	94,650		
Sept.	6	1,060	18	572	883	52,600	68,300	129,000	22,600	61,350		
Oct.	28	1,260	1	517	835	51,400	31,570	72,100	506	50,774		
Nov.	7	1,140	20	648	917	54,600	30,173	158,000	884	51,211		
Dec.	23	1,040	25	645	886	54,500	29,816	87,300	916	52,820		
Yearly			2,020		87.0	1,120	813,600	841,823	1,818,800	558,050	895,021	

Mean daily \$ And other days

RIO GRANDE BELOW CABALLO DAM, NEW MEXICO

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and winch located .80 river mile below Caballo Dam, and 106.8 river miles above American Dam at El Paso, Texas.

Elevation of zero of the gage is 4,140.90 feet above mean sea level, U.S.C. & G.S. datum.
RECORDS: Based on 72 meter measurements during the year and a continuous record of gage heights. Records available: February 26, 1938, to December 31, 1949. Records furnished by the El Paso office of the United States Bureau of Reclamation.

REMARKS: This gaging station was installed by the Bureau of Reclamation on February 26, 1938 to measure the flow from the Caballo Reservoir. Reservoirs, diversions, and drainage returns modify the river flow at this station. This station is about 1.5 miles upstream from Percha Dam (a low diversion dam) at which point records have been kept in past years. Small accretions to the river take place between this station and Percha Dam. There were diverted in 1949 from Caballo Reservoir into a small irrigation canal (Bonito Lateral) just below the dam 1,000 acre-feet of water not accounted for in the tables below.

COMPARATIVE FLOWS FROM RECORDS:

Average Flow in Second-Feet											
Daily:	Max.	7,650	May 20, 1942	Min.	1.1	Nov.	9 & 10, 1948	Oct.	2.3	43.0	3.1
Monthly:	Max.	6,710	May 1942	Min.	1.4	Dec.	1940	Nov.	5.6	5.6	3.4
Yearly:	Max.	2,480	1942	Min.	972			Oct.	3.2	3.6	3.6
								Nov.	764	3.2	3.6

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.3	2.5	2,850	1,560	1,470	2,260	2,480	1,980	2.3	43.0	3.1
2	2.6	2.2	2.5	2,720	1,520	1,340	2,260	2,380	1,890	531	5.6	3.4
3	2.7	2.2	2.5	2,700	1,440	1,180	2,370	2,440	1,810	832	3.5	3.7
4	2.7	2.1	2.5	2,570	1,510	1,410	2,190	2,540	1,740	816	3.2	3.6
5	2.9	2.1	570	2,400	1,610	1,540	2,460	2,210	1,670	764	3.2	3.6
6	2.7	2.1	939	2,450	1,610	1,510	2,460	2,160	1,510	646	2.9	3.6
7	2.6	2.1	885	2,480	1,600	1,510	2,150	2,150	1,250	543	2.9	3.7
8	2.6	2.1	944	2,180	1,610	1,670	2,300	2,040	1,060	379	2.9	3.8
9	2.6	2.1	954	2,020	1,550	1,770	2,640	1,870	852	327	2.9	3.8
10	2.6	2.1	1,070	2,050	1,440	1,720	2,760	1,820	739	264	2.9	3.7
11	2.6	2.1	1,160	2,030	1,280	1,870	2,660	1,820	388	126	2.9	3.7
12	2.6	2.1	1,320	1,910	1,120	2,010	2,490	1,660	204	26.0	2.9	3.6
13	2.6	2.1	1,420	1,540	1,000	1,900	2,160	1,640	204	10.0	3.2	3.6
14	2.6	2.3	1,420	1,170	1,130	1,800	2,110	1,730	373	6.3	4.1	3.6
15	2.7	2.1	1,430	1,120	1,170	1,790	1,960	1,700	234	3.1	4.4	3.6
16	2.5	2.1	1,390	1,260	1,120	1,800	2,090	1,770	5.9	3.1	4.4	356
17	2.1	2.1	1,240	1,360	1,190	1,730	2,120	1,980	3.5	3.1	4.4	446
18	2.3	2.1	1,100	1,340	1,300	2,110	2,110	2,180	2.8	3.1	4.4	244
19	2.6	2.1	1,720	1,340	1,260	2,360	2,020	2,200	3.1	3.1	3.5	48.0
20	2.6	2.1	1,990	1,290	1,340	2,380	1,980	2,160	3.1	3.1	419	7.6
21	2.6	2.1	2,160	1,130	1,530	2,340	2,040	2,270	2.8	90.0	653	5.2
22	2.6	2.1	2,340	1,060	1,760	2,220	1,990	2,290	2.4	262	593	4.8
23	2.6	2.1	2,390	1,180	1,700	2,120	1,980	2,250	2.4	241	479	4.8
24	2.5	2.1	2,460	1,260	1,450	2,030	2,120	2,150	2.5	202	436	5.1
25	2.5	2.1	2,510	1,200	1,190	2,200	1,890	2,160	2.6	88.0	244	4.6
26	2.5	2.3	2,650	1,190	1,480	2,500	1,720	2,190	2.7	61.0	71.0	4.5
27	2.4	2.3	2,720	1,250	1,280	2,250	1,610	2,230	2.6	51.0	9.0	4.8
28	2.4	2.5	2,760	1,270	1,390	2,210	1,620	2,310	2.5	59.0	3.9	4.7
29	2.4		2,800	1,270	1,470	2,240	1,770	2,300	2.4	78.0	3.4	5.0
30	2.3		2,750	1,400	1,390	2,310	2,200	2,180	2.3	77.0	3.1	4.8
31	2.3		2,730		1,400			2,520	2,050	76.0		5.1
Sum	60.2		50,970	43,400	57,090	65,110				6,576.2	1,209.1	
	78.7		47,812			67,810				15,947.6	3,021.6	

Current Year 1949**Period 1938-1949**

Month	Extreme Gage Feet		# Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet			
	High	Low	Day	Day			Normal	Maximum	Minimum	
Jan.	5	2.9	17	2.1	2.5	156	1,277	4,850	97.0	
Feb.	28	2.5	4	2.1	2.2	119	19,376	64,300	119	
Mar.	29	2,800	1	2.5	1,540	94,800	79,942	95,100	49,300	
Apr.	1	2,830	22	1,060	1,700	101,000	127,175	212,000	101,000	
May	22	1,760	13	1,000	1,400	86,100	126,075	412,000	78,400	
June	20	2,380	3	1,180	1,900	113,000	138,634	354,000	112,000	
July	10	2,760	27	1,610	2,190	135,000	141,867	234,000	109,000	
Aug.	1	2,480	13	1,640	2,100	129,000	132,817	179,000	110,000	
Sept.	1	1,980	30	2.3	532	31,600	71,075	181,000	31,600	
Oct.	3	832	1	2.3	212	13,000	13,797	35,400	111	
Nov.	21	653	4	2.9	101	5,990	7,347	14,400	107	
Dec.	17	446	1	3.1	39.0	2,400	7,620	19,100	83.3	
Yearly			2,830		2.1	984	712,165	867,002	1,795,620	703,547

* And other days # Mean daily

RIO GRANDE AT EL PASO, TEXAS

DESCRIPTION: Staff gage and cable located in the pass opposite Courchesne Quarry, 4 miles northwest of El Paso, Texas, 5 miles northwest of Juárez, Chihuahua, and .9 river mile above the American Dam. Zero of gage is 3,720.51 feet above mean sea level, U.S.C. & G.S. datum. Water-stage recorder 1 mile farther upstream with zero of its gage 3,722.30 feet on the same datum has been the official gage since August 3, 1938.

RECORDS: Discharges in 1949 were computed by taking the sum of the flows in the American Canal and the flows at the station below American Dam. Records available: 1889-1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 24,000 second-feet on June 12, 1905, with 6.0 feet stage (lower gage). Min., sometimes dry. Since Elephant Butte Dam was closed in 1915, the largest peak flow to pass this station was 13,500 second-feet on September 3, 1925.

Average Flow in Second-Feet

Daily:	Max.	23,680	June 12, 1905	Min.	sometimes dry
Monthly:	Max.	14,300	June 1905	Min.	sometimes dry
Yearly:	Max.	2,780	1905	Min.	70.1 1902

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	220	171	135	879	1,040	898	877	1,130	980	364	266	241
2	205	157	135	1,420	1,070	857	1,000	1,120	976	335	265	232
3	167	157	133	1,200	953	950	1,010	1,030	952	314	272	231
4	166	157	136	1,320	884	1,100	1,100	1,030	1,060	310	267	214
5	167	156	139	1,240	833	979	1,150	1,150	1,080	306	252	210
6	164	160	134	920	836	1,040	1,140	1,320	949	327	245	208
7	170	157	133	924	977	914	1,160	1,210	983	329	243	198
8	165	151	219	1,270	1,060	831	1,140	1,260	948	347	230	197
9	184	154	419	1,160	1,110	831	1,150	1,160	1,140	356	239	190
10	182	143	425	778	973	900	1,190	1,210	983	225	206	176
11	178	146	486	1,320	968	1,080	1,400	1,120	1,250	386	220	213
12	172	151	470	1,040	913	1,150	1,590	1,000	1,440	381	221	206
13	178	143	596	964	908	1,220	1,330	993	1,140	396	246	203
14	188	133	720	966	774	1,130	1,490	1,070	1,350	437	237	187
15	177	137	806	912	759	968	1,300	1,050	1,050	336	229	176
16	174	141	709	752	748	1,040	1,480	933	1,910	327	219	174
17	161	144	660	753	754	954	1,420	863	900	312	215	174
18	212	141	661	864	714	923	1,320	796	749	310	219	170
19	215	146	549	855	683	976	1,250	904	625	332	212	170
20	208	147	421	885	792	1,090	1,180	1,080	565	325	203	238
21	193	144	583	863	763	1,100	1,100	1,200	573	272	202	258
22	173	144	619	853	762	1,090	989	1,160	586	274	207	223
23	173	142	628	844	1,010	1,080	1,320	1,040	563	301	202	214
24	165	139	818	830	970	995	1,310	997	521	308	320	192
25	148	138	779	865	1,000	943	1,340	1,030	473	300	307	186
26	165	132	886	820	986	900	1,360	913	457	279	302	174
27	160	136	1,000	738	1,100	1,080	1,290	1,040	420	300	342	176
28	160	137	1,020	721	1,160	962	1,040	1,070	389	333	345	177
29	147	906	765	992	939	804	1,130	381	306	308	308	178
30	124	1,090	921	931	853	836	1,070	368	274	250	181	178
31	* 184	953	907			974	1,040		263			
Sum			4,104	28,842	29,773	33,019	10,123	6,175				
5,445			17,368	28,330	37,040	25,988	7,510					

Current Year 1949

Period 1924-1949

Acre-Feet

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High	Low			Normal	Maximum	Minimum
Jan.	3.59	3.23	18	233	30	65.8	10,800	11,094	17,500	7,770
Feb.	3.43	3.22	1	198	26	127	8,140	19,026	52,200	6,510
Mar.	6.35	3.11	27	2,170	5	126	560	34,400	62,500	18,400
Apr.	6.31	4.47	10	2,920	27	686	961	57,200	66,385	44,900
May	5.67	4.50	28	1,290	19	659	914	56,200	76,729	357,000
June	5.59	4.56	13	1,270	8	796	992	59,100	77,609	304,000
July	6.27	4.35	14	1,800	29	740	1,190	73,500	83,831	198,000
Aug.	5.75	4.55	6	1,420	18	771	1,070	65,500	86,767	158,000
Sept.	6.72	3.62	16	3,940	429	368	866	51,500	64,958	171,000
Oct.	4.10	3.36	14	478	31	256	327	20,100	26,605	57,900
Nov.	3.74	3.23	24	366	20	187	250	14,900	17,480	29,500
Dec.	3.53	3.12	20	296	419	164	199	12,200	16,455	27,700
Yearly	6.72	3.11		3,940		65.8	640	463,540	586,819	1,559,200
									431,680	604,633

* Partly estimated * And other days

RIO GRANDE BELOW AMERICAN DAM

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights located 3,200 feet below the American Dam and 1.5 miles above the International Dam, west of El Paso, Texas. The zero of the gage is 3,712.30 feet above mean sea level, U.S.C. & G.S. datum. The American Dam is 1,241.4 river miles above the Gulf of Mexico.

RECORDS: Based on 54 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: June 1, 1938 to December 31, 1949.

REMARKS: The operation of this station began June 2, 1938, when the American Dam first began operating. At this dam, part of the flow passing the El Paso gaging station was diverted into the American Canal (see records of "Diversions from the Rio Grande") and the remainder, including excess flood flows, passed this station. Reservoirs, diversions, and drainage returns modify the river flow at this station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 6,770 second-feet on May 18, 1942, with a gage height of 9.77 feet. Min. 0.3 second-feet on February 14, 1941.

Average Flow in Second-Feet

Daily:	Max.	6,040	May 20, 1942	Min.	1.2	Oct. 28-31, 1939
Monthly:	Max.	4,880	May 1942	Min.	2.0	Dec. 1942
Yearly:	Max.	1,510	1942	Min.	106	1945

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.5	109	97.2	122	194	201	152	160	164	87.2	9.5	8.9
2	11.8	127	97.5	461	233	178	156	153	171	26.6	7.8	7.5
3	100	110	95.7	123	217	187	153	150	159	22.3	6.9	7.2
4	165	104	53.8	206	232	175	157	165	163	18.4	56.3	7.3
5	166	97.6	7.3	126	233	165	162	170	158	17.8	200	7.4
6	163	102	6.5	142	233	164	172	158	158	16.3	200	7.1
7	169	106	5.6	163	245	158	190	163	158	14.4	200	7.1
8	164	102	7.0	157	242	161	205	163	148	137	193	7.4
9	184	74.2	8.2	155	224	163	207	164	309	224	200	7.0
10	181	71.5	6.8	158	243	170	194	164	217	232	193	7.8
11	177	104	6.6	280	243	180	196	160	197	235	190	7.8
12	171	104	6.4	127	238	170	528	158	496	239	193	7.3
13	177	95.6	7.2	124	227	168	167	158	176	246	87.5	6.9
14	188	89.6	7.7	123	221	162	167	155	515	258	13.4	6.9
15	177	86.5	7.8	132	226	161	122	151	148	212	9.0	6.5
16	174	96.9	7.1	125	224	159	388	154	1,050	79.8	8.4	6.5
17	161	100	* 3.5	125	244	154	114	157	113	9.5	7.6	6.0
18	212	97.8	* 2.0	125	237	146	144	158	138	6.9	7.4	5.5
19	215	99.2	* 2.0	132	238	145	154	160	160	5.2	7.6	5.5
20	208	101	* 2.0	137	238	158	141	161	175	4.6	7.3	6.0
21	193	102	* 2.0	145	235	161	142	166	169	38.7	6.9	6.1
22	175	102	* 2.0	156	241	166	150	161	204	140	6.0	5.8
23	173	101	* 2.0	158	248	165	155	154	216	165	6.7	5.5
24	165	99.1	* 2.0	145	235	173	153	155	184	178	8.6	5.2
25	148	99.2	* 2.0	155	235	164	158	157	161	181	8.2	5.3
26	165	94.8	* 2.6	148	235	159	164	156	163	179	10.4	5.5
27	160	102	* 4.0	149	232	158	170	182	161	183	12.1	5.6
28	160	102	* 211	155	212	167	171	180	199	217	12.3	5.4
29	147		11.5	154	221	159	209	171	195	210	9.3	4.4
30	124		12.6	147	221	164	173	163	184	77.2	* 9.9	4.2
31	147		9.2	155	236	152	157	157	10.4	10.4	3.6	
Sum		2,780.0	4,755	4,961	4,984	3,671.3	196.2					
4,931.3		* 698.8	7,183	5,966	6,809	1,888.1						

Current Year 1949**Period June 1938-1949**

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
							Normal	Maximum	Minimum
	High	Low	Day	Day	Day	Day	High	Day	Day
Jan.	5.75	1.45	4	235	3	10.4	159	9,780	8,763
Feb.	5.45	1.64	1	152	1	15.3	5,510	5,412	32,800
Mar.	7.63	2.8	2,880	#17	" 2.0	* 22.5	* 1,390	3,785	521
Apr.	7.15	1.60	11	1,960	1	6.9	158	9,430	17,500
May	5.91	5.36	23	286	1	141	232	14,200	14,121
June	5.69	3.35	1	228	9	127	165	9,840	74,500
July	6.74	5.02	16	1,390	17	43.3	192	11,800	6,360
Aug.	5.78	5.40	27	229	5	123	161	9,890	300,000
Sept.	7.50	5.00	16	2,920	17	50.5	227	13,500	11,700
Oct.	5.87	1.44	14	279	20	4.4	118	7,280	250,000
Nov.	5.71	1.40	6	211	23	5.3	161	3,750	9,660
Dec.	4.42	1.29	10	9.3	31	3.6	6.3	389	2,584
Yearly	7.63			2,920	" 2.0	134	96,759	181,592	1,862
								1,093,553	76,919

^{*} Estimated * Partly estimated [†] And other days

OUTFALLS FROM WELLS

Near El Paso, Texas, and Juárez, Chihuahua

Several outfall ditches or pipe lines discharge water into the Rio Grande between the station below American Dam and Juárez Station. The source of this water is wells in the vicinity of El Paso and Juárez, except that some of the water from the El Paso Sewage Outfall is from the Rio Grande. During 1949 such outfalls contributed a total of 11,333 acre-feet of water to the Rio Grande flow, which is equivalent to an average steady flow of 15.7 second-feet during the year. All of this flow came from the United States side.

EL PASO ELECTRIC COMPANY SANTA FE STREET PLANT COOLING WATER WASTE

This outfall enters the river 3.3 miles below the American Dam. From the company's pumping records and records of diversions from this outfall by the city of El Paso, it is calculated that 635 acre-feet flowed into the river in 1949. This corresponds to an average flow of .9 second-foot.

JUAREZ SEWAGE OUTFALL

This outfall enters the river 4.7 miles below the American Dam. From several inspections it was found that the flow from this source was too small to be of account.

PEYTON PACKING COMPANY WASTE

This outfall enters the river 5.7 miles below the American Dam. From several inspections, it was found that the flow from this source was too small to be of account.

EL PASO SEWAGE OUTFALL

This outfall enters the river 6.6 miles below the American Dam. The 1949 record of total outfall consists of flows measured by a Parshall meter and estimates of amounts which by-passed the meter made by the Department of Water and Sewerage of the City of El Paso. The breakdown of this total into water from wells, or from the Rio Grande, is made in co-operation with the El Paso Water and Sewerage Department. Water for 108 acres of land was diverted from this outfall between the sewage plant and the Rio Grande.

Month	1949				Period 1936-1949	
	From Wells		From Rio Grande		Estimated Diversions Acre-Feet	To Rio Grande
	Mean Sec.-Ft.	Acre-Feet	Mean Sec.-Ft.	Acre-Feet		Normal Acre-Feet
Jan.	14.0	862	.2	13.1	0	875
Feb.	8.8	490	5.3	293	0	783
Mar.	9.1	560	4.8	296	0	856
Apr.	10.3	615	4.2	247	89	773
May	10.6	652	3.9	238	86	804
June	11.8	700	4.8	285	86	899
July	13.1	805	5.5	337	98	1,044
Aug.	12.9	791	5.9	360	104	1,047
Sept.	11.8	700	5.7	337	77	960
Oct.	11.3	693	4.2	261	0	954
Nov.	14.5	865	0	0	0	865
Dec.	13.6	838	0	0	0	838
Year	11.8	8,571	3.7	2,667.1	540	10,698
						8,989

RIO GRANDE AT JUAREZ, CHIHUAHUA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located 2.9 river miles downstream from El Paso, Texas, and Juárez, Chihuahua. This station is 7.0 river miles below the American Dam at El Paso, Texas and 4.9 river miles below the International Dam. The zero of the gage is 3,683.98 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 169 meter measurements during the year, 120 by the Mexican and 49 by the United States Section of this Commission, and a continuous record of gage heights. Computations by shifting channel methods. Records available: April 1, 1938 to December 31, 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 6,600 second-feet on May 18, 1942 with a gage height of 11.15 feet. Min. 15.2 second-feet on December 22, 1944 with a gage height of 2.17 feet.

Average Flow in Second-Feet

Daily:	Max.	6,460	May 20, 1942	Min.	17.0	Dec. 21, 1944
Monthly:	Max.	5,290	May 1942	Min.	45.9	Dec. 1947
Yearly:	Max.	1,820	1942	Min.	335	1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	183	165	140	501	519	378	367	632	512	242	118	55.5
2	163	138	115	742	533	374	487	706	508	222	118	55.5
3	154	130	117	780	448	417	509	576	516	121	126	55.5
4	166	130	115	893	403	597	590	565	664	98.2	137	112
5	198	136	103	773	326	501	636	604	777	67.8	257	208
6	188	133	109	463	325	544	692	848	551	96.1	246	208
7	189	149	57.6	445	438	491	632	727	568	79.8	234	208
8	190	145	55.8	710	519	388	586	777	512	183	234	215
9	201	142	232	742	509	364	593	703	671	321	243	215
10	212	107	209	516	403	413	675	629	819	364	236	222
11	212	125	261	848	424	590	848	696	858	374	237	222
12	200	131	273	604	367	674	1,090	565	1,010	286	225	128
13	198	136	388	509	371	749	904	501	795	271	231	54.4
14	218	131	558	526	277	674	992	636	724	344	124	54.4
15	195	136	632	509	223	470	699	618	* 646	266	71.3	50.1
16	183	141	438	441	215	544	901	498	* 1,430	222	66.7	75.6
17	161	140	342	509	224	487	858	438	* 477	118	71.0	202
18	180	130	357	431	204	452	830	360	* 388	72.0	75.2	195
19	189	129	287	459	171	537	773	403	* 293	106	72.7	202
20	177	128	202	456	236	632	706	576	* 177	154	65.0	231
21	173	127	228	424	255	685	646	742	* 177	121	62.5	252
22	161	132	357	434	212	604	551	720	* 177	337	63.9	231
23	158	137	297	420	399	576	883	611	* 181	316	61.8	54.4
24	155	129	501	420	410	498	1,060	554	205	315	66.4	80.5
25	164	121	445	454	452	438	971	569	255	295	67.5	207
26	204	108	456	406	452	409	1,010	424	268	261	63.6	200
27	203	96.1	466	288	600	544	862	530	245	302	63.2	54.0
28	166	102	682	273	731	413	625	614	195	284	66.4	41.0
29	163	572	316	494	438	374	653	194	256	62.5	59.3	68.5
30	91.8	735	480	459	357	304	572	187	225	58.6	167	
31	177	653	427			424	551		123			
Sum	3,654.1		15,752		15,238		18,598		6,842.9		4,383.7	
	5,572.8		10,383.4		12,026		22,078		* 14,940		3,824.3	

Current Year 1949

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	Day			Normal	Maximum	Minimum
	High	Low	Day	Day	Acre-Feet				
Jan.	3.77	3.05	31	255	30	59.3	180	11,050	11,219
Feb.	3.87	3.02	9	300	10	54.0	151	7,250	11,419
Mar.	5.87	2.69	28	* 1,330	8	31.1	335	20,600	26,731
Apr.	5.45	3.61	11	* 1,810	27	224	525	31,240	45,034
May	5.41	3.44	28	862	20	151	388	23,850	54,571
June	5.71	4.00	12	929	30	312	508	30,220	56,845
July	6.36	3.90	12	1,330	30	285	712	43,790	55,734
Aug.	5.64	3.94	6	915	18	332	600	36,890	54,068
Sept.	6.79	3.12	16	* 3,110	24	113	* 498	* 29,630	41,668
Oct.	4.33	2.92	1	413	31	61.1	221	13,570	18,708
Nov.	3.94	2.85	13	274	30	55.1	127	7,590	45,390
Dec.	4.04	2.82	20	280	28	* 30.4	141	8,700	13,670
Yearly	6.79	2.69		* 3,110		30.4	365	261,380	396,045
								1,315,890	243,050

* Estimated * Partly estimated

RIO GRANDE AT ISLAND STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located near Clint, Texas, and San Augustín, Chihuahua. This station is on the rectified channel of the Rio Grande 27.1 river miles below the American Dam at El Paso, Texas. The zero of the gage is 3,608.99 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 72 meter measurements during the year, 54 by the United States and 18 by the Mexican Section of this Commission, and a continuous record of gage heights. The gage height - discharge relationship was very unstable during January, February, and the first few days of March. Computations by shifting channel methods. Records available: August 17, 1938 to December 31, 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 6,490 second-feet on May 19, 1942 with a gage height of 16.06 feet. Min., sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	6,140	May 19, 1942	Min.		sometimes dry
Monthly:	Max.	4,880	May 1942	Min.	.2	Nov. 1940
Yearly:	Max.	1,490	1942	Min.	48.8	1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	* Jan.	* Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	125	196	* 85.3	14.2	# 9.4	22.5	8.7	11.6	12.8	108	8.3	6.6
2	150	162	* 85.1	68.2	# 9.7	19.1	9.1	13.3	14.1	336	* 8.3	6.7
8	150	152	* 81.5	72.6	# 10.1	17.0	9.9	17.0	13.1	210	* 8.6	6.8
4	153	147	* 88.3	120	# 10.5	21.1	10.8	16.2	13.4	80.7	8.2	6.9
5	127	139	* 82.7	71.7	# 12.0	48.6	11.2	15.5	201	47.9	7.8	6.9
6	144	124	* 77.6	40.3	# 8.8	21.3	12.3	117	242	10.4	7.5	7.0
7	146	128	* 70.8	17.3	* 8.8	18.4	12.7	148	154	9.4	7.1	7.1
8	141	132	* 62.7	39.4	# 8.8	15.3	11.6	64.4	199	8.3	6.7	7.5
9	151	124	36.5	127	154	14.4	11.0	167	164	112	8.4	7.4
10	164	147	29.8	43.2	30.1	13.2	11.4	35.2	530	14.3	9.9	7.9
11	159	117	29.4	193	26.8	33.3	11.4	28.1	435	11.5	9.7	7.8
12	149	124	29.7	* 87.6	25.2	80.4	182	30.4	685	11.3	9.2	7.8
13	164	124	29.2	53.5	23.8	92.9	246	25.5	456	10.3	9.0	7.1
14	203	120	28.7	* 19.4	22.3	81.8	308	76.7	588	10.0	8.8	6.7
15	182	103	28.8	* 19.4	21.1	* 21.6	342	57.6	674	56.6	8.6	6.0
16	154	106	23.7	# 19.4	19.3	15.9	313	26.0	1,340	41.1	7.9	5.8
17	151	113	21.3	* 19.4	19.3	14.6	381	20.3	443	13.8	7.4	6.0
18	130	106	18.8	43.2	18.6	12.7	232	21.3	313	11.6	5.9	6.2
19	160	103	16.2	67.7	18.6	12.5	359	22.3	346	10.7	4.6	6.3
20	131	103	14.1	25.8	18.0	13.2	139	19.8	300	10.5	5.2	6.9
21	139	100	12.5	17.0	17.3	13.0	83.9	22.7	228	10.5	5.6	60.2
22	135	97.4	14.9	14.3	16.7	12.9	32.2	25.7	282	19.0	6.0	9.2
23	143	84.8	15.7	12.3	16.6	10.6	49.5	18.1	199	138	6.4	10.7
24	129	89.8	16.5	11.1	20.6	9.5	339	14.5	148	140	6.8	173
25	125	84.2	17.6	# 10.2	17.1	10.1	243	14.3	82.4	140	7.3	183
26	144	98.4	16.0	* 9.2	18.9	8.6	415	13.4	21.2	136	7.4	175
27	169	97.3	41.7	# 8.7	21.5	8.4	298	11.2	17.1	55.5	7.4	101
28	146	87.7	121	* 8.2	106	8.5	184	11.0	15.3	11.8	7.1	8.1
29	144	16.3	* 8.6	98.7	8.3	25.2	24.7	13.1	10.1	7.0	9.0	
30	127	13.7	* 9.0	58.7	8.7	13.3	18.6	16.1	9.4	6.9	39.8	
31	99.8	35.2	27.2			11.1	13.8			9.0		106
Sum	* 3,307.8		* 1,270.9		668.4		1,117.2		1,803.7		1,012.4	
	* 4,534.8		* 1,259.6		894.5		4,316.3		8,145.6		225.0	

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet				
	High		Low	High				Normal	Maximum	Minimum		
	High	Low	Day	Day	Day							
Jan.	10.45	10.00	19	* 237	30	* 88.2	* 146	* 8,990	9,278	11,900		
Feb.	10.38	9.63	1	* 318	25	* 35.4	* 118	* 6,560	7,845	37,000		
Mar.	11.87	9.29	28	1,540	21	12.1	* 40.6	* 2,500	5,006	21,000		
Apr.	11.91	11	1,630	28	* 8.2	* 42.4	* 2,520	10,268	10,500	876		
May	11.75	9	1,340	* 6	* 8.8	28.9	1,770	30,731	299,800	1,050		
June	11.03	9.28	12	538	27	7.8	22.3	1,330	25,975	241,000		
July	11.20	9.29	15	879	1	8.4	139	8,560	17,857	118,500		
Aug.	11.06	9.37	14	785	29	10.1	36.0	2,220	17,726	2,220		
Sept.	12.82	9.18	16	2,460	29	12.7	272	16,200	20,364	119,200		
Oct.	10.46	9.20	2	374	9	8.2	58.2	3,580	9,050	42,800		
Nov.	9.19	9.07	10	9.9	19	4.6	7.5	446	2,151	7,270		
Dec.	10.35	8.92	24	302	15	5.6	32.7	2,010	4,188	12,900		
Yearly	12.82			2,460		4.6	78.3	56,686	160,417	1,079,340	35,430	

* Estimated * Partly estimated * And other days * Mean daily

RIO GRANDE AT COUNTY LINE

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located .8 mile downstream from the El Paso-Hudspeth county line. This gaging station is on the rectified channel of the Rio Grande 47.3 river miles below the American Dam at El Paso, Texas. The zero of the gage is 3,547.59 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 52 meter measurements during the year, 43 by the United States and 9 by the Mexican Section of this Commission and a continuous record of gage heights. The gage height - discharge relationship was very unstable during the period January 1 to February 23. Computations by shifting channel methods. Records available: January 1, 1938 to December 31, 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 6,340 second-feet on May 19, 1942 with a gage height of 8.66 feet. Min. Sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	6,180	May 18, 1942	Min.	Sometimes dry.
Monthly:	Max.	4,920	May 1942	Min.	3.0 Aug. 1949
Yearly:	Max.	1,720	1942	Min.	82.9 1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	* Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	200	* 225	93.7	9.3	0	106	0	* 5.1	0	177	224	185
2	203	* 211	89.4	8.4	0	100	0	* 5.8	0	264	231	108
3	214	* 195	89.3	83.7	0	104	0	* 4.1	0	243	220	98.8
4	208	* 189	85.8	72.0	0	92.8	0	1.6	0	187	218	97.1
5	203	* 187	98.8	37.2	0	98.0	0	0	92.5	228	218	85.8
6	206	* 179	83.8	21.4	0	104	0	0	128	192	239	74.8
7	197	* 171	80.1	4.8	0	98.3	0	0	123	170	202	253
8	189	* 164	71.8	2.2	0	93.4	0	0	287	171	204	99.2
9	187	* 169	46.9	81.3	31.6	56.0	0	12.1	196	214	206	132
10	197	* 179	39.4	19.9	28.4	40.3	0	12.1	417	221	223	96.5
11	200	* 169	31.9	70.3	85.3	31.4	0	18.1	324	241	221	68.9
12	208	* 174	26.5	22.1	88.0	7.0	0	9.7	572	269	233	74.9
13	206	* 171	27.6	6.7	116	21.9	74.8	3.9	524	255	198	61.7
14	211	* 169	27.6	3.5	126	15.5	8.0	4.4	408	277	208	62.1
15	214	* 171	33.9	4.3	122	5.0	183	7.7	1,170	302	179	145
16	206	* 169	27.7	6.3	50.6	0	31.4	4.6	1,260	260	166	134
17	214	* 171	17.3	5.4	47.8	0	196	2.6	972	188	153	140
18	195	* 171	6.9	5.6	41.3	0	65.2	0	650	133	134	167
19	219	* 171	12.5	5.4	23.5	0	6.4	0	605	162	122	129
20	219	* 166	13.6	3.4	2.2	0	7.1	0	* 415	138	186	144
21	214	* 164	12.2	3.1	1.8	0	14.6	0	* 359	99.8	176	149
22	211	* 164	10.6	5.2	0	30.5	13.3	0	401	142	158	194
23	219	* 164	9.3	5.1	30.9	41.4	11.1	0	420	284	173	226
24	214	162	8.4	1.4	41.8	19.3	47.0	0	382	292	196	177
25	208	152	7.4	3.5	42.8	19.6	49.1	0	382	248	242	181
26	219	122	8.0	4.2	56.5	26.7	214	0	260	234	246	157
27	222	139	9.5	6.5	116	21.0	250	0	159	204	217	146
28	203	120	59.1	7.8	118	15.6	106	0	149	197	230	118
29	203	204	20.4	3.0	172	15.2	22.3	0	151	254	247	140
30	179	9.1	0	145	8.4	8.4	8.3	0	139	293	258	132
31	192	10.2	110			4.8	0		271			148

Sum *4,758 513.0 1,171.3 91.8 6,810.8 4,124.8

*6,380 1,166.7 1,597.5 1,312.4 10,945.5 6,128

Current Year 1949

Period 1938-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			
	High	Low	Day	Day	Low			Normal	Maximum	Minimum	
					High	Low	Day				
Jan.	3.58	3.06	27	* 222	30	*179	*206	* 12,700	15,178	20,000	9,730
Feb.	3.56	2.83	1	* 225	28	93.9	*170	* 9,440	13,738	47,900	3,430
Mar.	3.34	1.85	28	247	18	2.3	37.6	2,310	12,222	38,900	360
Apr.	3.47		11	500	\$ 8	0	17.1	1,020	18,790	84,200	290
May	3.55		9	274	\$ 1	0	51.5	3,170	36,341	305,000	200
June	2.99		1	108	\$ 15	0	39.0	2,320	38,026	239,000	2,320
July	3.63		27	385	\$ 1	0	42.3	2,600	27,963	140,000	1,320
Aug.	2.55		9	57.8	\$ 4	0	3.0	182	28,001	123,000	182
Sept.	5.28		16	2,370	\$ 1	0	365	21,700	31,953	140,000	3,220
Oct.	3.31	2.31	16	345	22	59.7	220	13,500	21,009	61,400	1,590
Nov.	3.22	2.54	\$ 25	282	19	113	204	12,200	13,859	20,400	7,980
Dec.	3.34	1.99	7	352	6	44.7	133	8,180	15,708	29,700	8,180

Yearly 5.28 2,370 0 123 89,322 266,788 1,247,500 * 60,160

* Partly estimated \$ Mean daily \$ And other days

RIO GRANDE AT FORT QUITMAN, TEXAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights located on the rectified channel of the Rio Grande 1.5 miles below Old Fort Quitman and 81.1 river miles below the American Dam at El Paso, Texas. The zero of the gage is 3,450.57 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 61 meter measurements during the year, 48 by the United States and 13 by the Mexican Section of this Commission, and a continuous record of gage heights. The gage height - discharge relationship was very unstable during the periods: January 1 to February 11, and November 11 to December 31. Computations by shifting channel methods. Records available: January 1923 to December 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 10,600 second-feet October 5, 1946, with a gage height of 10.00 feet. Min., dry March 30, 1935.

Average Flow in Second-Feet

Daily:	Max.	5,890	May 19, 1942	Min.	*0.9	May 31 to June 4, 1935
Monthly:	Max.	5,630	May 1942	Min.	*14.3	May 1935
Yearly:	Max.	1,750	1942	Min.	*104	1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	* Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	* Dec.									
1	188	*189	94.4	38.3	62.7	114	107	155	105	308	349	321									
2	197	*178	* 75.1	40.4	63.5	93.0	93.7	106	93.7	352	348	264									
3	200	*167	# 59.2	42.9	79.0	98.4	88.5	81.1	105	345	341	215									
4	209	*168	#118	45.6	67.6	92.3	92.8	78.9	115	315	318	245									
5	206	*166	*128	43.6	68.4	115	71.3	78.9	145	261	329	245									
6	218	*160	104	43.1	61.2	112	74.6	83.3	269	* 277	328	218									
7	213	*164	102	45.8	61.7	85.5	67.3	106	273	* 248	311	226									
8	184	*162	87.4	46.7	71.5	79.4	66.0	123	192	* 248	315	212									
9	173	*165	85.5	45.5	98.7	83.2	92.1	138	199	* 222	333	226									
10	173	*160	102	46.9	76.2	90.8	65.9	144	198	* 260	355	222									
11	184	*169	110	58.9	115	72.8	69.8	142	275	# 260	* 319	192									
12	186	140	107	54.3	114	78.5	132	128	351	# 270	* 345	192									
13	177	126	96.7	64.9	105	88.3	104	169	650	* 296	* 347	219									
14	173	117	87.9	68.5	117	85.2	88.8	163	456	* 296	* 345	204									
15	184	115	79.2	73.7	122	91.6	89.5	207	1,550	* 307	* 337	209									
16	184	118	90.1	70.2	104	142	90.2	189	1,230	* 343	* 316	229									
17	228	119	77.2	73.9	97.2	109	105	145	1,740	* 350	* 252	193									
18	226	114	85.2	69.1	84.7	92.1	99.7	117	1,030	* 302	* 222	209									
19	209	112	71.9	72.8	82.1	95.0	83.4	131	1,300	263	* 187	195									
20	200	113	79.9	72.1	78.1	98.1	88.6	101	* 894	183	* 171	208									
21	193	111	67.8	84.3	86.4	86.1	* 274	86.0	* 663	174	* 199	194									
22	184	109	47.2	109	99.1	101	# 118	82.4	546	329	* 202	191									
23	184	109	42.6	90.0	96.5	100	# 202	77.0	484	504	* 196	256									
24	191	109	39.9	83.1	77.1	111	# 127	73.7	387	394	* 217	231									
25	195	109	39.6	99.3	105	110	# 218	77.5	328	391	* 222	199									
26	202	109	38.5	95.4	97.1	117	* 179	88.9	334	447	282	222									
27	195	97.2	38.3	68.5	73.9	118	247	75.3	287	407	286	206									
28	191	90.6	37.2	69.3	72.4	99.7	265	82.8	257	381	273	203									
29	206		39.0	68.8	112	83.0	223	100	284	368	312	179									
30	195		38.8	67.0	142	94.5	186	96.5	362	389	335	204									
31	213		39.1		122		178	110		355		199									
Sum	*3,765.8			1,951.9			2,936.5			* 9,818											
	*6,061			2,307.6			3,985.2			15,029.7											

Current Year 1949

Period 1924-1949

Acre-Feet

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1924-1949		
	High	Low	Day	High	Low		Normal	Maximum	Minimum			
Jan.	3.51	2.66	21	# 400	10	* 127	* 196	* 12,000	13,298	20,900	5,370	15,108
Feb.	3.48	2.43	2	* 288	28	87.2	* 134	* 7,470	13,508	50,100	3,510	14,556
Mar.	" 2.78	2.04	5	# 147	27	35.4	74.4	4,580	11,270	38,900	1,090	11,513
Apr.	2.69	2.04	26	122	1	36.3	65.1	3,870	14,132	77,000	1,200	14,365
May	2.80	2.22	30	173	1	52.4	90.7	5,580	25,685	309,000	880	35,761
June	3.27	2.27	16	284	12	60.9	97.9	5,820	23,362	240,000	3,630	32,156
July	4.20	2.14	21	1,280	10	58.8	129	7,900	22,660	140,000	2,000	27,462
Aug.	3.50	2.31	16	469	27	62.9	114	7,010	29,204	* 127,000	2,490	26,697
Sept.	7.32	2.40	19	4,170	1	86.0	501	29,800	33,675	147,000	5,480	35,978
Oct.	4.06	2.72	22	913	9	* 140	* 317	* 19,500	24,754	66,500	4,520	27,483
Nov.	3.47	2.69	15	* 565	23	* 117	* 290	* 17,200	15,732	24,500	4,990	16,508
Dec.	3.78	2.70	23	* 659	25	* 114	* 217	* 13,300	16,388	31,000	5,640	17,135
Yearly	7.32	2.04		4,170		35.4	* 185	* 134,030	243,608	1,270,400	* 75,340	274,922

* Estimated * Partly estimated

RIO GRANDE AT UPPER PRESIDIO STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located 7.8 river miles above the confluence of the Río Conchos and about 10 miles northwest of the towns of Presidio, Texas, and Ojinaga, Chihuahua, and 285.7 river miles below the American Dam at El Paso, Texas. The zero of the gage is 2,576.82 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 38 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: May 1900 to March 1914, and August 1923 to December 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 15,200 second-feet on June 12, 1912.

On May 26, 1942, a gage height of 10.57 feet was reached with a flow of 5,160 second-feet. This level was the highest reached during the years 1923-1949 inclusive. Min., sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	15,200	June 12, 1912	Min.	sometimes dry
Monthly:	Max.	10,150	June 1912	Min.	sometimes dry
Yearly:	Max.	1,970	1907	Min.	43.7 1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	93.0	195	69.5	5.8	2.6	0	0	* 100	" .2	" 142	254	205
2	* 78.9	176	58.8	5.6	2.4	0	0	" 79.8	0	" 136	256	* 214
3	* 75.8	184	49.4	4.8	1.6	0	0	" 63.9	0	* 125	239	* 233
4	* 79.2	206	47.3	4.5	1.3	0	0	" 54.5	0	131	255	240
5	89.8	227	37.2	3.1	1.4	0	0	" 45.9	0	167	243	204
6	* 106	201	31.3	7.7	1.4	0	1.8	* 71.6	387	249	236	166
7	* 118	181	34.7	13.8	1.4	0	1.8	225	96.8	274	232	157
8	125	168	33.2	8.8	2.0	0	.9	645	111	227	231	163
9	128	158	31.7	2.5	3.7	0	1.8	297	50.8	" 166	230	152
10	162	147	31.1	3.1	1.8	0	1.8	1,380	210	* 150	234	158
11	211	135	28.7	4.9	.6	106	.8	281	1,390	136	223	185
12	239	149	23.3	4.4	.2	102	.6	768	1,410	121	222	147
13	375	162	22.8	3.3	590	47.2	.4	287	1,010	108	213	145
14	* 356	163	23.6	6.1	66.6	15.9	.3	163	495	120	211	147
15	238	149	17.8	3.8	18.5	13.7	.2	149	364	114	210	142
16	* 209	131	17.9	6.8	11.6	9.1	0	164	478	138	197	141
17	* 193	107	17.0	4.6	9.6	4.6	0	206	596	159	185	142
18	* 182	98.4	16.6	2.6	8.9	0	0	343	1,490	241	190	140
19	* 168	93.4	15.8	7.3	10.2	0	0	* 293	1,560	254	189	147
20	* 174	90.0	15.4	8.4	9.1	0	0	* 140	1,680	277	179	169
21	* 187	90.3	13.6	6.7	3.6	0	0	90.3	1,580	215	172	151
22	*	88.8	12.4	9.1	2.7	0	0	55.5	1,780	200	160	155
23	212	* 83.6	10.7	5.2	1.8	0	0	69.2	1,040	196	155	141
24	224	* 79.1	8.5	4.3	.9	0	0	* 49.8	* 562	574	159	140
25	217	* 76.3	6.7	3.9	* 0	0	0	* 94.4	" 329	334	157	136
26	207	86.4	6.2	3.6	* 0	0	111	* 191	" 237	310	151	169
27	196	75.3	6.4	3.2	* 0	0	306	90.2	" 208	269	151	186
28	194	72.4	5.7	2.8	0	0	396	* 40.9	" 188	263	169	175
29	193	5.5	3.5	0	0	0	352	" 14.9	" 169	291	194	174
30	207	5.8	3.0	0	0	0	69.4	" 1.5	" 149	285	207	172
31	208	6.2	0	0	0	0	124	" .4	266	179	179	
Sum		3,773.0		157.4		298.5		6,454.8		6,638		5,175
		5,633.7		710.8		753.9		1,368.8		17,570.8		6,084

Current Year 1949

Period 1924-1949

Acre-Feet

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949		
	High	Low	Day	Day			Normal	Maximum	Minimum			
	High	Low	Day	Day	Acre-Feet							
Jan.	4.95	* 2.74	13	564	3	" 72.6	11,200	12,599	24,400	644	14,907	
Feb.	3.66	2.70	5	231	28	69.2	135	7,480	11,945	40,800	1,420	13,330
Mar.	2.72	1.71	1	72.7	29	3.7	22.9	1,410	9,587	39,100	285	10,231
Apr.	2.62	1.68	22	59.1	* 9	1.2	5.2	312	7,881	41,600	0	7,581
May	6.06		13	999	* 25	0	24.3	1,500	18,874	240,000	0	26,640
June	5.32		11	526	* 1	0	10.0	592	18,078	216,000	* 218	26,638
July	6.17		27	747	* 1	0	44.2	2,720	23,885	156,000	* 13.1	31,373
Aug.	8.65	* 1.82	10	1,920	31	* 3	208	12,800	31,763	133,000	* 128	28,318
Sept.	8.64		20	1,900	* 1	0	586	34,900	36,235	* 151,000	602	35,810
Oct.	7.06	2.84	24	1,040	13	104	214	13,200	30,727	105,000	0	31,816
Nov.	3.93	3.25	2	264	26	147	203	12,100	15,000	34,500	0	14,475
Dec.	3.88	3.09	4	243	23	124	167	10,300	14,599	30,900	374	15,358
Yearly	8.65			1,920		0	150	108,514	231,173	1,176,700	31,731.1	256,477

* Estimated * Partly estimated * And other days

RIO CONCHOS AT CUCHILLO PARADO, CHIHUAHUA

DESCRIPTION: Water-stage recorder and cable with cable car, located in Salineta Canyon, 3.1 miles north of the town of Cuchillo Parado, Chihuahua and 28.6 air-line miles westward from Ojinaga, Chihuahua, and 49.1 river miles above the confluence of the Río Conchos with the Rio Grande which is 293.5 river miles below the American Dam at El Paso, Texas. Zero of the gage is 2,914.23 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 167 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: January 1, 1945 to December 31, 1949.

REMARKS: The flow of this stream is modified by irrigation diversions and drainage returns and is affected by the operation of La Rosetilla, La Colina, and La Boquilla reservoirs situated 139, 199, and 206 river miles respectively above this station and also by Madero Reservoir located on the San Pedro River, which enters the Río Conchos 122 river miles above this station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Maximum 34,360 second-feet on October 9, 1945 with a gage height of 15.85 feet. Min., 53.3 second-feet on September 17, 1945, with a gage height of 2.00 feet.

Average Flow in Second-Feet

Daily: Max. 17,660 Oct. 9, 1945 Min. 57.2 Sept. 17, 1945
 Monthly: Max. 3,580 Sept. 1946 Min. 120 Sept. 1945
 Yearly: Max. 972 1946 Min. 494 1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	830	1,080	858	225	181	264	148	2,500	280	2,200	1,285	759
2	1,370	794	1,120	245	161	300	147	2,140	281	2,000	1,180	734
3	876	749	1,120	253	194	318	133	1,110	351	1,940	1,200	876
4	473	837	1,050	263	234	283	151	959	309	1,760	964	982
5	544	992	1,110	218	179	262	155	897	533	1,150	1,130	967
6	494	1,190	907	232	239	225	130	2,680	1,080	1,410	1,190	802
7	445	1,080	1,030	255	245	242	175	5,260	551	1,410	1,360	491
8	388	1,010	922	287	249	251	151	2,290	417	1,410	1,320	434
9	352	950	819	202	191	241	170	2,150	516	1,150	1,410	664
10	388	1,120	1,060	173	158	192	281	2,560	735	1,080	1,400	491
11	509	1,220	1,190	165	685	255	244	5,190	851	1,140	1,100	671
12	413	1,170	1,360	231	327	403	505	4,660	2,310	833	1,440	565
13	336	1,140	1,250	278	537	264	523	2,360	2,220	953	1,040	551
14	360	1,220	1,390	218	406	224	385	2,240	3,920	805	1,110	579
15	357	1,270	1,210	173	265	272	523	1,960	4,380	904	1,020	657
16	392	1,320	1,040	189	183	245	682	1,540	4,630	1,030	1,080	738
17	403	1,320	777	192	159	282	911	1,540	2,840	1,100	996	720
18	406	1,410	688	243	260	226	579	2,590	1,660	1,200	1,120	724
19	388	1,340	865	374	254	212	498	1,750	1,780	1,940	1,010	572
20	334	1,310	738	319	301	182	367	985	1,750	1,580	830	710
21	396	1,380	618	228	286	221	327	1,390	1,490	1,430	1,110	848
22	501	1,150	537	219	232	177	547	816	1,480	1,380	809	893
23	519	1,120	650	327	203	157	1,320	713	1,820	939	632	844
24	504	1,040	487	392	226	135	3,820	600	2,230	1,000	819	1,010
25	788	1,090	409	336	193	141	5,790	1,180	2,010	1,080	738	890
26	554	1,040	392	285	316	166	4,660	1,200	2,200	1,070	738	996
27	749	1,010	374	353	713	237	3,240	1,200	2,260	925	819	788
28	696	347	295	572	174	2,700	664	2,280	1,050	1,080	501	501
29	1,040	258	229	332	353	2,500	505	2,240	1,200	911	595	595
30	1,220	268	236	385	150	2,390	388	2,290	1,010	855	724	890
31	1,300	255	307	3,310	337	1,260	5,310	337	2,290	1,260	890	890
Sum			31,472	7,633	7,054	56,334	51,694	39,339	31,696	22,664		
Sum			18,326	25,099	9,113	37,462	31,694	22,664				

RIO CONCHOS NEAR OJINAGA, CHIHUAHUA

DESCRIPTION: The Río Conchos enters the Rio Grande 3.7 miles above the international highway bridge between Presidio, Texas, and Ojinaga, Chihuahua, 2.0 miles above the Lower Presidio gaging station on the Rio Grande, 7.8 miles below the Upper Presidio gaging station on the Rio Grande, and 293.5 river miles below the American Dam at El Paso, Texas.

RECORDS: Based on discharge records of the Rio Grande at Upper Presidio and Lower Presidio stations and estimated irrigation diversions and arroyo inflow between these two stations. Records available: May 1900 to March 1914, and August 1923 through 1949.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. La Colina Reservoir with 21,900 acre-feet capacity and a maximum surface area of 1,160 acres located about 10.5 miles downstream from La Boquilla Dam, and La Rosetilla Reservoir located about 52.7 miles farther downstream with a capacity of 15,400 acre-feet and a maximum surface area of 840 acres, are used for power development. Francisco I. Madero Reservoir located on the San Pedro River, a tributary to the Río Conchos, has a total capacity of about 344,550 acre-feet. Power generation facilities: La Boquilla 14,647 kw., La Colina 3,620 kw., La Rosetilla 5,150 kw., Francisco I. Madero, none.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 162,000 second-feet on September 11, 1904. Min. 3.0 second-feet on May 14, 1904.

Average Flow in Second-Feet

Daily:	Max.	148,900	Sept. 11, 1904	Min.	5.0	May 14, 1904
Monthly:	Max.	24,540	Sept. 1904	Min.	11.0	May 1902
Yearly:	Max.	3,710	1906	Min.	511	1948

Month	Current Year 1949				Period 1924-1949			Acre-Feet	
	Extreme Second-Feet		Average Second- Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949	# Average 1945-1949
	Day	High			Day	Low	Normal		
Jan.	3	1,580	14	331	546	33,600	59,354	147,000	20,300
Feb.	19	1,630	1	586	1,100	61,100	51,081	87,700	29,100
Mar.	15	1,540	30	247	829	51,000	45,927	80,800	20,900
Apr.	22	937	12	162	252	15,000	32,133	79,700	5,000
May	13	3,130	6	142	273	16,800	38,222	148,000	3,950
June	12	1,660	26	99.0	224	13,300	42,590	91,900	8,720
July	25	7,160	10	90.8	1,160	71,400	90,585	502,000	8,890
Aug.	11	10,800	31	349	2,130	131,000	131,688	601,000	11,300
Sept.	14	7,380	3	244	1,630	97,200	271,011	1,173,000	6,770
Oct.	1	2,540	15	603	1,310	80,300	166,588	798,000	33,200
Nov.	11	1,690	26	593	1,070	62,800	63,531	110,000	29,000
Dec.	6	1,200	14	483	745	45,800	54,862	97,700	22,200
Yearly		10,800		90.8	940	680,300	1,047,572	2,431,850	371,000
[#] Estimated		[#] And other days [#] Cuchillo Parado Station began operating January 1, 1945.							1,061,601
									618,136

[#] Estimated [#] And other days [#] Cuchillo Parado Station began operating January 1, 1945.

RIO GRANDE AT LOWER PRESIDIO STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located about 1.7 miles above the international highway bridge between Presidio, Texas, and Ojinaga, Chihuahua, 2.0 miles below the confluence of the Río Conchos with the Río Grande and 295.5 river miles below the American Dam at El Paso, Texas. Zero of gage is 2,556.42 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 64 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: May 1900 to July 1915 and August 1923 to December 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 162,000 second-feet on September 11, 1904. Min. 3.0 second-feet on May 14, 1904.

Average Flow in Second-Feet

Daily:	Max.	149,200	Sept. 11, 1904	Min.	5.0	May 14, 1904
Monthly:	Max.	24,870	Sept. 1904	Min.	11.0	May 1902
Yearly:	Max.	4,870	1906	Min.	553	1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	496	*1,340	1,230	260	187	288	133	* 3,320	316	2,470	1,480	1,050
2	1,030	1,090	937	250	178	260	106	2,620	269	2,290	1,540	984
3	1,400	941	1,220	240	158	239	103	1,850	259	2,010	1,420	964
4	864	843	1,180	261	151	263	104	1,020	* 535	2,040	1,450	1,140
5	634	1,110	1,080	256	184	252	97.0	980	438	1,700	1,230	1,110
6	667	1,120	1,110	231	162	230	103	1,700	847	1,430	1,380	1,170
7	619	1,350	961	218	159	201	206	5,280	1,040	1,700	1,390	902
8	577	1,140	1,050	221	179	203	117	4,310	559	1,660	1,520	723
9	549	1,130	919	260	211	188	120	3,780	409	1,440	1,540	722
10	550	1,080	842	212	187	193	99.5	* 4,130	599	1,280	1,650	800
11	739	1,250	*1,110	190	169	440	158	6,250	1,930	1,190	1,580	751
12	761	1,330	1,190	178	565	746	180	4,450	2,490	1,210	1,440	851
13	776	1,300	1,290	174	1,310	548	395	4,220	4,360	854	1,550	716
14	773	1,270	1,240	236	496	259	459	2,910	4,260	1,060	1,290	735
15	641	1,380	1,320	211	404	223	325	2,650	4,060	822	1,340	732
16	608	1,410	1,140	190	294	217	469	* 1,880	* 5,620	1,030	1,250	821
17	649	1,390	1,010	175	217	190	631	1,970	4,150	1,220	1,280	838
18	648	1,420	700	185	178	220	714	2,530	3,520	1,470	1,170	898
19	639	1,470	759	201	200	178	468	2,990	2,850	1,820	1,270	813
20	596	1,400	870	262	216	166	399	1,770	2,760	2,120	1,170	825
21	556	1,400	729	267	242	156	346	1,480	2,600	1,700	*1,040	825
22	613	1,450	685	310	261	163	321	1,550	2,790	1,660	1,310	1,040
23	744	1,200	611	348	220	142	766	* 959	2,520	1,610	* 902	1,020
24	764	1,240	637	414	200	127	>180	789	2,590	1,590	877	1,020
25	812	1,140	505	415	189	112	* 5,400	809	2,600	1,510	991	1,170
26	894	1,190	428	365	186	114	5,500	1,380	2,440	1,480	845	1,070
27	851	1,120	404	267	275	583	124	5,250	1,850	2,540	1,390	981
28	895	1,110	387	242	500	116	3,120	1,290	2,480	1,200	980	863
29	* 997		329	242	341	220	3,340	714	2,420	1,340	1,260	710
30	* 1,230		264	200	341	220	* 2,740	521	2,340	1,560	1,120	832
31	* 1,440		265	295			* 2,710	415		1,290		975
Sum			34,594	7,481	6,894	72,347	47,146					28,260
24,012			26,402	9,097	37,059.5	66,591	38,246					

Current Year 1949

Period 1924-1949

Acre-Feet

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	Day	Low			Normal	1924-1949	
Jan.	3.48	1.90	3	1,650	1	433	775	47,600	72,054	164,000
Feb.	3.57	* 2.44	19	1,720	4	740	1,240	68,600	63,019	33,900
Mar.	3.42	1.55	15	1,560	30	254	852	52,400	55,492	89,400
Apr.	2.70	1.36	22	942	\$12	170	249	14,800	39,422	84,100
May	4.57	1.32	13	3,130	6	143	293	18,000	56,795	270,000
June	3.48	1.20	12	1,670	26	99.0	230	13,700	60,383	267,000
July	7.37	1.11	25	7,160	10	91.7	1,200	73,500	115,623	564,000
Aug.	9.21	1.73	11	11,100	31	349	2,330	144,000	165,069	675,000
Sept.	7.54	1.55	14	7,840	3	244	2,220	132,000	307,272	1,324,000
Oct.	4.44	2.34	1	2,690	15	722	1,520	93,500	197,323	844,000
Nov.	3.67	2.30	10	1,920	26	742	1,270	75,900	78,542	141,000
Dec.	3.21	2.13	27	1,400	14	628	912	56,100	69,454	116,000
Yearly	9.21	1.11		11,100		91.7	1,090	790,100	1,276,448	3,466,700
										401,500
										1,316,351

* Estimated * Partly estimated † And other days

ALAMITO CREEK NEAR PRESIDIO, TEXAS

DESCRIPTION: Water-stage recorder about 1,800 feet above the confluence with the Rio Grande and 6 miles below Presidio, Texas, and Ojinaga, Chihuahua. This creek enters the Rio Grande near the lower end of Presidio Valley and 306.9 river miles below the American Dam at El Paso, Texas. Zero of gage is 2,541.42 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on a continuous record of gage heights except for the period March 4 to 31 when the recorder was not in operation. All steady low flows were based upon frequent estimates by the hydrographer and the low stage hydrograph because at times the gage well was isolated by low sand or gravel bars. All other flows were based upon the gage height hydrograph and the station rating curve. Records available: January 1932 to December 1949.

REMARKS: The flow of this spring-fed creek is modified by a small irrigation reservoir (San Estaban) 10.5 miles south of Marfa, Texas and by irrigation diversions below the reservoir. On October 2, 1932, backwater from the Rio Grande reached a gage height of 8.33 feet at this station. This is the highest recorded gage height.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 9,670 second-feet on July 20, 1937 with a gage height of 5.33 feet. Min. .87 second-foot in May 1932.

Average Flow in Second-Feet

Daily:	Max.	3,290	Oct. 24, 1941	Min.	.87	May 1-22, 1932
Monthly:	Max.	329	Sept. 1936	Min.	2.0	Feb. 1935
Yearly:	Max.	55.9	1941	Min.	8.8	1934

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	* 8.0	3.0	3.0	3.0
5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	* 6.6	3.0	3.0	3.0	3.0
6	3.0	3.0	3.0	3.0	3.0	3.0	3.0	* 68.8	3.0	3.0	3.0	3.0
7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	* 224	3.0	3.0	3.0	3.0
8	3.0	3.0	3.0	3.0	3.0	3.0	* 13.5	* 38.8	3.0	3.0	3.0	3.0
9	3.0	3.0	3.0	3.0	3.0	* 22.8	3.0	* 164	3.0	3.0	3.0	3.0
10	3.0	3.0	3.0	3.0	* 7.5	3.0	3.0	* 3.6	3.0	3.0	3.0	3.0
11	3.0	3.0	3.0	* 5.0	* 335	3.0	* 28.2	3.0	3.0	3.0	3.0	3.0
12	3.0	3.0	3.0	3.0	* 316	3.0	* 3.0	* 65.6	3.0	3.0	3.0	3.0
13	3.0	3.0	3.0	3.0	* 28.7	* 33.9	* 3.0	* 47.8	3.0	3.0	3.0	3.0
14	3.0	3.0	3.0	3.0	3.0	* 4.8	* 3.0	* 3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 45.0	3.0	3.0	3.0	3.0
16	3.0	3.0	3.0	3.0	3.0	3.0	* 100	* 125	3.0	3.0	3.0	3.0
17	3.0	3.0	3.0	3.0	3.0	3.0	* 50.0	* 4.0	3.0	3.0	3.0	3.0
18	3.0	3.0	3.0	3.0	3.0	3.0	* 25.0	* 3.0	3.0	3.0	3.0	3.0
19	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 66.1	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 358	3.0	* 13.7	3.0	3.0
21	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 3.0	3.0	3.0	3.0	3.0
22	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 3.0	3.0	3.0	3.0	3.0
23	3.0	3.0	3.0	3.0	3.0	* 201	* 3.0	* 11.5	3.0	3.0	3.0	3.0
24	3.0	3.0	3.0	* 4.8	3.0	* 156	* 3.0	* 55.5	3.0	3.0	3.0	3.0
25	3.0	3.0	* 8.7	3.0	3.0	* 3.0	* 3.0	* 13.7	3.0	3.0	3.0	3.0
26	3.0	3.0	3.0	3.0	3.0	3.0	* 3.2	* 3.0	3.0	3.0	3.0	3.0
27	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 3.0	3.0	3.0	3.0	3.0
28	3.0	3.0	3.0	3.0	3.0	3.0	* 3.0	* 3.0	3.0	3.0	3.0	3.0
29	3.0	3.0	3.0	3.0	3.0	* 23.0	* 66.5	* 3.0	3.0	3.0	3.0	3.0
30	3.0	3.0	3.0	3.0	3.0	* 3.0	* 111	* 3.0	3.0	3.0	3.0	3.0
31	3.0	3.0	3.0	3.0	3.0	* 3.0	* 6.2	* 3.0	3.0	3.0	3.0	3.0
Sum	■ 84.0	■ 97.5	■ 99.5	* 800.5	* 1,017.1	* 768.0	* 162.7	■ 90.0	■ 93.0	■ 93.0	■ 93.0	■ 93.0

Month	Current Year 1949						Period 1932-1949						Acre-Feet Normal 1938-1949	
	Extreme Gage Feet			Extreme Second-Feet			Average Second- Feet	Total	Acre-Feet					
	High	Low	Day	High	Low	Day			Normal	Maximum	Minimum			
Jan.	\$ 1	■ 3.0	■ 1	■ 3.0	■ 1	■ 3.0	■ 3.0	■ 184	206	273	123	214		
Feb.	\$ 1	■ 3.0	■ 1	■ 3.0	■ 1	■ 3.0	■ 3.0	■ 167	189	234	111	194		
Mar.	\$ 1	■ 3.0	■ 1	■ 3.0	■ 1	■ 3.0	■ 3.0	■ 184	203	270	123	212		
Apr.	4.02	■ 66.6	■ 1	■ 3.0	■ 1	■ 3.0	■ 3.2	■ 193	242	743	119	277		
May	3.81	10	■ 22.1	■ 1	■ 3.0	■ 1	■ 3.2	■ 197	1,350	8,520	184	1,163		
June	5.25	11	* 2,790	■ 1	■ 3.0	* 26.7	* 1,590	1,816	* 6,360	206	1,606			
July	5.27	25	* 2,940	■ 1	■ 3.0	* 32.8	* 2,020	2,806	6,650	232	2,568			
Aug.	5.17	7	* 2,360	■ 1	■ 3.0	* 24.8	* 1,520	3,458	16,330	216	2,132			
Sept.	5.12	16	* 2,110	■ 1	■ 3.0	* 14.4	* 854	3,732	19,600	179	2,179			
Oct.	4.08	24	* 170	■ 1	■ 3.0	* 5.2	* 323	2,417	19,200	157	3,105			
Nov.		\$ 1	■ 3.0	■ 1	■ 3.0	■ 3.0	■ 3.0	■ 179	254	807	119	248		
Dec.		\$ 1	■ 3.0	■ 1	■ 3.0	■ 3.0	■ 3.0	■ 184	227	408	117	237		
Yearly	5.27		* 2,940		■ 3.0	* 10.5	* 7,595	16,900	40,444	* 6,397	14,135			

* Estimated * Partly estimated ^ And other days

TERLINGUA CREEK NEAR TERLINGUA, TEXAS

DESCRIPTION: Water-stage recorder located about 12 miles south of Terlingua, Texas, 2.4 river miles above the confluence with the Rio Grande at the lower end of Santa Helena Canyon. Zero of gage is 2,192 ± .5 feet above mean sea level, U.S.G.S. datum. This creek enters the Rio Grande 371.6 river miles below the American Dam at El Paso, Texas.

RECORDS: Based on 48 meter measurements during the year at low flow, a continuous record of gage heights for medium and high flows from January 1 to July 24, except for the period March 8 to 31 when the recorder was not in operation, and for all flows from July 25 to December 31, and a rating curve, the higher points of which were determined by slope-area calculations and the medium and low points of which were determined by meter measurements. Computations by shifting channel methods. Records available: January 1, 1932 to December 31, 1949.

REMARKS: The flow of this spring-fed creek is modified by irrigation diversions above the station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 34,900 second-feet on May 24, 1935. with a gage height of 17.59 feet. Min., 0 second-feet on September 29-30, 1937.

Average Flow in Second-Feet

Daily:	Max.	17,200	June 1, 1937	Min.	" 0	Sept. 29-30, 1937
Monthly:	Max.	921	June 1937	Min.	.83	Oct. 1934
Yearly:	Max.	146	1937	Min.	5.5	1943

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	# 2.2	# 2.3	# 2.4	# 2.1	# 6.8	# 1.8	* 10.6	* 10.4	2.1	4.3	4.2	3.9
2	# 2.2	* 2.2	# 2.4	# 2.2	* 2.1	# 1.8	* 10.6	# 8.5	2.1	3.3	3.4	4.0
3	* 2.2	# 2.3	# 2.4	* 2.2	* 2.1	# 1.7	* 10.6	# 6.6	2.8	3.5	3.4	4.0
4	# 2.2	# 2.3	# 2.4	# 2.2	* 44.9	# 1.7	* 10.6	# 4.7	2.8	3.5	3.4	3.8
5	# 2.1	# 2.4	# 2.4	# 2.2	# 4.0	# 1.7	* 10.6	5.3	2.2	24.8	3.3	4.0
6	# 2.1	# 2.4	# 2.3	# 2.2	# 3.3	* 1.7	# 10.6	568	2.2	12.9	3.3	4.0
7	# 2.1	# 2.5	# 2.3	# 2.2	# 2.6	# 1.7	# 183	126	2.2	3.5	3.3	4.0
8	# 2.0	# 2.6	# 2.5	# 2.2	# 1.9	* 9.5	# 186	516	2.0	3.2	3.2	4.0
9	# 2.0	# 2.6	# 2.5	# 2.2	* 1.2	* 9.9	# 143	479	3.7	3.2	3.2	4.0
10	# 2.0	# 2.7	# 2.5	# 2.2	# 1.2	# 26.4	# 111	609	38.1	2.9	3.1	4.2
11	# 1.9	# 2.7	# 2.2	* 2.2	# 1.2	* 426	# 51.1	* 89.8	* 118	2.9	2.9	4.5
12	* 1.9	* 2.8	# 2.2	# 2.1	# 1.3	* 28.2	# 126	* 207	* 113	2.8	2.7	3.8
13	* 2.0	* 2.8	# 2.2	# 2.0	# 1.3	* 10.5	# 133	* 850	* 438	2.8	2.8	3.8
14	* 2.0	# 2.7	* 2.2	# 1.9	# 1.3	# 7.1	* 67.4	129	* 684	2.7	2.8	3.7
15	* 2.1	# 2.7	# 2.3	# 2.2	# 1.8	# 5.4	# 43.5	27.4	* 331	2.7	2.8	3.5
16	# 2.1	# 2.6	# 2.1	# 1.7	# 1.3	* 4.4	# 33.1	* 52.1	* 361	2.9	2.9	3.5
17	# 2.2	# 2.6	# 2.0	# 1.6	# 1.3	# 4.3	* 22.7	* 135	* 421	2.9	2.9	3.4
18	# 2.3	# 2.6	# 2.0	# 1.5	# 1.4	# 4.2	* 12.2	* 85.0	* 204	3.1	3.0	3.0
19	# 2.3	# 2.5	# 1.9	* 1.4	# 1.4	# 4.2	* 1.8	* 59.7	* 224	3.1	3.2	3.0
20	# 2.4	# 2.5	# 1.8	* 1.4	* 1.4	# 4.1	* 1.8	* 108	* 535	2.8	3.2	3.2
21	# 2.4	# 2.4	# 1.8	* 1.4	# 1.5	* 4.0	# 166	* 124	* 198	2.8	2.9	2.9
22	# 2.5	* 2.4	# 1.7	* 115	# 1.6	# 3.5	# 291	* 52.5	28.2	3.1	3.1	2.9
23	# 2.6	# 2.4	# 1.7	* 25.0	# 1.8	# 3.0	# 248	10.9	10.1	* 631	3.4	2.9
24	# 18.4	# 2.4	# 1.8	* 35.0	* 1.9	* 2.5	* 477	3.1	6.7	* 1,350	3.3	2.9
25	# 2.7	# 2.4	# 1.8	* 30.0	# 1.9	# 2.4	* 1,980	2.6	4.1	* 160	3.4	2.9
26	# 2.7	# 2.4	# 1.9	* 30.0	# 1.9	# 2.2	* 349	2.4	3.1	21.2	3.3	2.8
27	* 2.8	# 2.4	# 1.9	* 25.4	# 1.9	* 208	* 165	2.2	3.0	8.0	3.4	2.8
28	# 2.7	# 2.4	# 1.9	* 20.7	# 1.8	# 123	* 226	2.2	2.8	4.8	3.4	2.8
29	# 2.6	# 2.0	# 1.6	# 1.8	# 1.8	# 26.6	* 355	2.3	3.2	4.0	3.5	2.8
30	# 2.5	# 2.0	# 1.14	# 1.8	# 1.8	# 11.2	* 135	2.3	3.4	3.7	3.8	3.3
31	# 2.4	# 2.1	# 1.8	# 1.8	# 1.8	# 7.3	* 22.5	2.4	3.7	3.7	3.0	3.0
Sum	# 70.0		* 347.4			* 942.7		* 4,283.4		* 2,286.1		107.3
	=86.6		=64.8		* 103.0		* 5,593.7		* 3,751.8		96.5	

Month	Extreme Gage Feet			Extreme Second-Feet			Average Second-Feet	Total Acre-Feet	Period 1932-1949			Acre-Feet Normal 1938-1949	
	High		Low	High		Low			Acre-Feet				
	High	Low	Day	High	Day	Low			Normal	Maximum	Minimum		
Jan.	# 1.90		23	# 143	# 11	# 1.9	# 2.8	172	203	743	82.7	229	
Feb.		# 12	# 2.8	2	# 2.2	# 1.8	# 2.5	139	140	267	73.4	145	
Mar.		# 1	# 2.1	422	# 1.7	# 1.1	# 2.1	129	176	489	72.4	175	
Apr.	3.35		22	* 982	# 19	# 1.1	* 11.6	689	1,148	15,500	55.1	1,620	
May	3.14		4	* 691	# 3	# 1.2	* 3.3	204	4,760	* 26,000	117	2,980	
June	7.01		11	* 5,800	# 3	# 1.7	* 31.4	* 1,870	6,883	54,800	59.5	3,499	
July	6.06		25	* 4,240	# 19	# 1.8	* 180	* 11,100	6,164	26,800	621	7,257	
Aug.	6.11		9	* 4,320	# 27	1.9	* 138	* 8,500	4,307	* 26,680	123	2,944	
Sept.	5.47	1.60	15	* 3,430	# 6	1.7	* 125	* 7,440	6,523	24,600	223	2,466	
Oct.	6.50	1.60	23	* 4,900	# 14	2.7	* 73.7	* 4,530	2,373	8,100	50.8	1,576	
Nov.	1.67	1.60	1	4.5	# 13	2.6	3.2	191	375	* 2,980	64.9	396	
Dec.	1.70	1.60	# 10	6.1	21	2.6	3.5	213	354	3,080	90.0	207	
Yearly	7.01			* 5,800	# 1.2	* 48.6	* 35,177	33,206	105,807	3,958.0	23,494		

* Estimated * Partly estimated # And other days # Mean daily

RIO GRANDE AT JOHNSON RANCH, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch, located about 2 miles above Johnson Ranch, 14 miles below Castolon, Brewster County, Texas, and Santa Helena Ranch, Chihuahua and 392.9 river miles below the American Dam at El Paso, Texas. Zero of the gage is 2,045.30 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 69 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: April 1936 to December 1949.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 58,800 second-feet on September 23, 1938 with a gage height of 19.75 feet. Min. 23.1 second-feet on June 6, 1938 with a gage height of .84 foot.

Average Flow in Second-feet

Daily:	Max.	56,900	Sept. 10, 1942	Min.	27.2	June 14, 1938
Monthly:	Max.	23,600	Sept. 1942	Min.	133	April 1947
Yearly:	Max.	4,780	1942	Min.	574	1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1	457	1,270	1,060	233	612	290	154	2,710	539	2,470	1,300	1,150	
2	444	1,390	1,120	224	285	225	232	2,890	441	2,380	1,490	1,100	
3	557	1,280	1,060	301	216	212	127	2,290	387	2,250	1,560	1,070	
4	1,150	1,060	973	185	200	474	103	1,780	340	2,070	1,470	1,030	
5	1,050	1,040	1,090	251	1,520	548	86.8	*	1,240	339	2,080	1,470	1,060
6	751	1,010	1,050	249	315	1,560	85.2	4,090	564	1,920	1,280	1,220	
7	670	1,200	1,040	246	393	*	277	305	5,190	589	1,490	1,440	1,160
8	659	1,240	981	240	256	231	227	8,050	1,090	1,780	1,430	1,140	
9	624	1,240	927	209	194	1,210	236	5,660	766	1,670	1,560	873	
10	588	1,140	937	198	513	314	211	6,200	586	1,560	1,540	768	
11	565	1,120	865	198	332	9,720	111	5,770	731	1,350	1,610	842	
12	555	1,170	895	211	361	1,670	122	7,190	1,430	1,260	1,640	786	
13	728	1,290	1,060	180	297	1,580	573	6,320	2,940	1,270	1,430	810	
14	754	1,310	1,210	154	735	962	101	3,860	5,970	1,110	1,720	845	
15	770	1,290	1,150	147	832	448	486	2,640	4,380	1,040	1,400	738	
16	682	1,370	1,250	147	423	264	294	2,210	5,660	1,040	*1,390	816	
17	620	1,390	1,140	178	356	204	266	1,970	5,720	*	*1,300	816	
18	597	1,390	1,010	173	303	200	294	2,100	3,880	1,220	1,380	868	
19	612	1,410	903	160	283	168	456	2,570	3,760	1,460	1,250	874	
20	621	1,450	712	145	283	129	493	2,930	3,440	1,730	1,330	967	
21	613	1,420	780	155	250	126	386	1,920	3,030	2,120	1,220	814	
22	598	1,400	788	1,560	194	108	1,060	*	1,440	2,650	1,900	1,130	894
23	692	1,450	657	2,630	172	95.8	661	*	1,580	2,720	2,210	1,250	910
24	708	1,270	565	702	360	*	80.9	1,750	2,550	4,640	1,130	1,060	1,010
25	733	1,210	596	882	204	80.9	5,980	924	2,620	2,260	913	913	967
26	736	1,170	501	508	169	160	8,940	684	2,400	*	1,730	1,000	1,150
27	867	1,110	440	440	160	100	4,780	1,030	2,300	1,510	1,000	1,130	1,130
28	783	1,110	377	333	152	1,180	4,780	*	1,630	2,400	1,410	931	1,190
29	880		341	274	206	560	3,540	*	1,440	2,440	1,240	1,070	1,090
30	822		295	261	431	194	3,510	*	868	2,450	1,320	1,200	880
31	1,090		264		384	2,670	*	633		1,480		871	
Sum	35,200		12,074		23,371.6		90,869		53,945		29,932		
	21,996		26,037		11,391		43,020		69,112		39,774		

Current Year 1949

Period April 1936-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949			
	High		Low	High				Normal	Maximum	Minimum				
	High	Low		Day	Day									
Jan.	2.90	1.32	23	2,000	2	437	710	43,600	86,400	35,900	65,042			
Feb.	2.61	1.92	20	1,610	6	917	1,260	69,800	59,092	80,900	44,600			
Mar.	2.38	1.01	16	1,360	31	248	840	51,600	49,470	85,300	50,292			
Apr.	8.11	.72	22	15,800	20	137	402	23,900	25,859	79,300	7,940			
May	5.76	.81	5	7,580	28	148	367	22,600	59,359	240,000	8,830			
June	12.56	.70	11	28,900	24	76.3	779	46,400	70,950	251,000	12,600			
July	9.04	.62	26	16,300	6	80.0	1,390	85,300	145,822	620,000	10,700			
Aug.	6.92	1.75	8	10,300	26	627	2,930	180,000	150,536	485,000	17,000			
Sept.	6.39	1.19	14	9,210	5	307	2,300	137,000	369,650	1,404,000	20,000			
Oct.	6.75	1.94	24	9,970	17	899	1,740	107,000	211,643	929,000	39,200			
Nov.	2.85	1.87	14	1,830	25	863	1,330	78,900	77,571	164,000	40,500			
Dec.	2.43	1.76	1	1,350	15	712	966	59,400	65,550	110,000	29,600			
Yearly	12.56	.62		28,900		76.3	1,250	905,500	1,349,832	3,461,400	1,401,339			

* Partly estimated

SPECIAL STATIONS IN BIG BEND AREA

During part of the year 1949 nine special gaging stations, equipped with water-stage recorders, were operated on the Rio Grande between Santa Helena Canyon and Langtry in conjunction with an investigation of dry weather losses and gains in the river channel. 1949 records are based on current meter measurements shown below and a continuous record of gage heights. Computations for all were by shifting channel methods. These stations are described as follows:

SANTA HELENA STATION: At the mouth of Santa Helena Canyon, .2 river mile above the mouth of Terlingua Creek, and 370.9 river miles below the American Dam at El Paso, Texas. 7 current meter measurements by wading by the U.S. Section.

MARISCAL STATION: Near the head of Mariscal Canyon 417.8 river miles below the American Dam at El Paso, Texas. 5 current meter measurements by wading by the U.S. Section.

BOQUILLAS STATION: A quarter of a mile east of Boquillas, Texas, and 447.7 river miles below the American Dam at El Paso, Texas. Zero of the gage is 1,802.73 feet above mean sea level, U.S.G.S. datum. 6 current meter measurements by wading by the U.S. Section.

MARAVILLAS STATION: .4 river mile above the mouth of Maravillas Creek and 489.2 river miles below the American Dam at El Paso, Texas. 3 current meter measurements by wading by the U.S. Section.

HORN PUMP STATION: 4.8 river miles above the mouth of Reagan Canyon and 501.4 river miles below the American Dam at El Paso, Texas. 4 current meter measurements by wading by the U.S. Section.

SAN FRANCISCO STATION: 1.6 river miles above the mouth of San Francisco Creek and the Terrell-Brewster County line, and 542.0 river miles below the American Dam at El Paso, Texas. 6 current meter measurements by wading by the Mexican Section.

AQUA VERDE STATION: Cable with stand-up cable car equipped for winch and heavy weights, located at the Aqua Verde Dam Site and 571.7 river miles below the American Dam at El Paso, Texas. Zero of gage is 1,241.07 feet above mean sea level, U.S.C. & G.S. datum. 10 current meter measurements, some by wading and others from the cable, by the Mexican Section.

UPPER LOZIER STATION: About 5 river miles above the mouth of Lozier Creek and 595.3 river miles below the American Dam at El Paso, Texas. 5 current meter measurements by wading by the Mexican Section.

LOWER LOZIER STATION: About 3.5 river miles below the mouth of Lozier Creek and 603.8 river miles below the American Dam at El Paso, Texas. 5 current meter measurements by wading by the Mexican Section.

Mean Daily Discharge in Second Feet—1949

* Partly estimated

RIO GRANDE AT LANGTRY, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch located at Langtry, Texas, 79.5 miles above Villa Acuña, Coahuila, and 614.1 river miles below the American Dam at El Paso, Texas. Zero of the gage is 1,091.69 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 48 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: May 1900 to October 1914; December 1919 to March 1920; and January 1924 to December 1949.

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

EXTREME FLOWS: The highest gage height known is 56.9 feet which occurred about 3:00 P.M. June 17, 1922. The discharge for this stage was 204,000 second-feet which was estimated by extension of the rating curve. The lowest flow of record is 270 second-feet which occurred in May 1904.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1	709	1,070	1,330	644	796	594	1,680	3,110	1,590	2,700	1,710	1,270	
2	701	1,040	1,320	627	* 744	528	1,020	* 2,840	1,280	2,700	1,750	1,360	
3	693	1,270	1,310	611	668	668	811	3,050	1,090	2,720	1,790	1,460	
4	685	1,430	1,280	609	673	748	619	3,170	984	2,780	1,700	1,450	
5	664	1,550	1,340	582	1,010	639	539	2,810	*	2,660	1,850	1,400	
6	651	1,410	1,250	577	952	570	599	6,340	*	922	5,290	1,870	
7	1,200	1,240	1,240	723	1,020	615	547	3,360	913	3,020	1,820	1,310	
8	1,150	1,210	1,310	650	1,250	2,920	475	12,200	716	2,410	1,800	1,350	
9	989	1,230	1,260	541	1,040	4,540	500	6,700	739	2,000	1,660	1,410	
10	912	1,350	1,250	509	758	2,860	*	650	720	823	1,860	1,380	
11	904	1,450	1,190	492	668	1,650	*	525	8,250	1,670	1,920	1,780	
12	862	1,390	1,180	480	1,050	8,740	534	7,620	1,990	1,890	1,840	1,140	
13	848	1,340	1,160	463	727	* 6,760	557	6,980	2,130	1,720	1,870	1,060	
14	832	1,320	1,110	452	711	* 2,300	548	7,200	11,700	1,610	1,940	1,100	
15	825	1,370	1,140	435	845	1,720	703	6,400	7,580	1,550	1,860	1,090	
16	945	1,460	1,270	451	745	1,620	540	* 4,250	8,200	1,550	1,810	1,110	
17	973	1,460	1,410	432	1,180	1,260	654	* 3,360	12,000	1,420	1,850	1,180	
18	955	1,460	1,360	422	1,400	993	529	* 2,790	5,700	1,400	1,670	1,100	
19	911	1,540	1,410	848	914	*	816	520	2,610	5,310	1,380	1,670	1,160
20	860	1,580	1,340	2,030	743	*	709	634	2,520	4,250	1,350	1,610	1,150
21	843	1,570	1,240	1,840	671	*	630	585	2,830	3,840	1,490	1,600	1,170
22	877	1,600	1,120	824	620	*	600	722	3,260	3,880	1,670	1,530	1,180
23	910	1,700	988	1,590	546	599	987	2,520	3,640	3,610	1,590	1,210	
24	901	1,600	1,010	3,130	501	364	1,500	2,060	*	3,180	10,900	1,530	1,110
25	876	* 1,920	1,040	4,690	458	525	2,750	1,680	*	2,970	7,380	1,440	1,170
26	910	* 1,450	922	1,870	445	10,400	2,660	1,750	*	2,870	4,230	1,560	1,220
27	952	* 1,400	869	1,280	794	1,320	7,560	1,420	*	2,790	2,450	1,430	1,320
28	943	* 1,360	819	1,200	794	581	6,700	1,390	*	2,690	2,140	1,290	1,320
29	943	825	*	983	752	524	5,510	1,170	*	2,640	1,880	1,330	1,410
30	1,020	760	*	882	495	1,160	*	4,820	1,740	2,720	1,840	1,320	1,440
31	986	705	439					4,760	2,160		1,730		1,490
Sum		39,750	30,847	24,409	58,153		125,260		83,250		50,210		39,180
	27,430	35,758			51,738			101,702					

Current Year 1949

Period 1924-1949

Acre-Feet

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949			
	High	Low	Day	High	Low			Normal	Maximum	Minimum				
Jan.	1.52	.76	7	1,310	6	643	885	54,400	93,984	*	245,000			
Feb.	2.76	1.18	25	2,870	2	997	1,420	78,800	81,387	*	117,000			
Mar.	1.58	.73	17	1,440	31	668	1,150	70,900	77,335	118,000	48,100			
Apr.	5.38	.31	24	7,620	18	404	1,030	61,200	62,285	105,000	28,500			
May	4.04	.30	17	5,080	31	425	787	48,400	98,437	271,000	26,900			
June	12.76	.32	26	23,200	1	439	1,940	115,000	101,120	299,000	25,400			
July	6.72	.32	27	9,740	8	428	1,670	103,000	155,770	719,000	31,700			
Aug.	10.92	1.13	8	19,200	29	1,130	4,040	248,000	203,777	*	730,000			
Sept.	12.14	.62	14	22,100	9	681	3,390	202,000	369,849	1,410,000	35,700			
Oct.	11.47	1.56	24	20,800	20	1,290	2,690	165,000	255,951	1,065,000	55,200			
Nov.	2.00	1.34	15	1,960	28	1,250	1,670	99,600	103,338	*	211,000			
Dec.	1.66	1.15	31	1,530	13	1,030	1,260	77,700	90,740	135,000	49,800			
Yearly	12.76	.30		23,200		404	1,830	1,324,000	1,693,975	3,851,500	633,900	1,725,089		

* Estimated * Partly estimated

PECOS RIVER NEAR COMSTOCK, TEXAS

DESCRIPTION: Water-stage recorder, and cable with sit-down cable car and winch, located at the Pecos High Bridge on the railroad 12 miles northwest of Comstock, Texas, 5.5 miles above the confluence with the Rio Grande. This river enters the Rio Grande 638.2 river miles below the American Dam at El Paso, Texas. Zero of the gage is 1,058.01 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 23 meter measurements during the year and continuous record of gage heights. Water-stage recorder installed May 11, 1942. Computations by shifting channel methods. Records available: March 17, 1898 to December 3, 1898, and May 1900 to December 1949.

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

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. The lowest flow recorded was on August 31, 1930, when the extreme gage height was -.15 foot and the extreme flow was 97 second-feet.

Mean Daily Discharge in Second Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	215	224	336	164	721	230	187	333	210	208	355	225
2	217	224	288	163	556	226	187	287	210	208	344	224
3	216	221	256	162	487	219	193	260	208	207	336	224
4	213	218	238	169	473	211	191	248	203	209	329	227
5	212	215	233	165	434	208	185	243	197	206	321	226
6	212	212	223	164	1,500	206	185	259	193	250	306	222
7	211	209	209	167	1,170	212	176	285	195	276	302	218
8	211	206	212	170	752	237	173	5,120	195	255	298	220
9	213	206	210	171	578	1,200	170	2,350	195	239	295	236
10	217	204	202	165	483	359	168	777	196	228	291	225
11	217	202	199	158	564	293	168	489	194	221	295	224
12	216	202	203	160	556	269	165	387	194	213	284	220
13	216	207	206	159	410	965	160	345	498	208	277	215
14	215	211	203	158	458	290	161	318	1,200	208	277	212
15	218	208	198	151	395	433	244	291	283	208	273	211
16	217	203	198	149	352	423	585	273	349	208	269	207
17	217	203	199	145	408	344	211	268	1,450	206	265	209
18	218	203	194	147	439	318	196	323	699	203	261	211
19	216	207	186	829	328	284	204	271	420	203	257	214
20	213	209	187	858	441	264	201	255	444	201	253	213
21	217	212	195	1,580	517	250	187	253	311	201	249	217
22	226	213	190	686	586	236	182	250	282	205	241	211
23	243	256	186	563	332	229	184	240	258	265	238	209
24	237	230	184	3,180	302	218	178	230	245	2,400	240	203
25	232	658	185	2,560	283	215	173	225	236	1,120	239	207
26	231	358	180	1,460	273	320	16,600	223	228	558	241	211
27	231	258	176	863	269	403	1,120	220	228	538	241	212
28	231	356	173	580	335	219	1,780	220	222	464	237	213
29	225		173	1,540	296	200	840	220	222	428	233	217
30	225		167	1,600	260	193	527	219	211	397	230	235
31	225		166		243		399	215		368		256
Sum		6,735	19,186		9,674		15,897		11,309		6,774	
6,823		6,355		15,001		26,280		10,176		8,277		
Current Year 1949												
Month	Extreme Gage Feet			Extreme Second-Foot			Average Second-Feet	Total Acre-Feet	Period 1924-1949			Acre-Feet Normal 1938-1949
	High	Low	Day	Day	High	Low			Normal	Maximum	Minimum	
Jan.	.79	.63	23	246	4	7	211	13,500	24,433	78,200	12,900	25,700
Feb.	2.92	.63	25	1,380	17	200	241	13,400	19,492	62,300	10,900	20,884
Mar.	1.16	.49	1	369	31	164	205	12,600	18,512	40,700	11,100	18,705
Apr.	5.33	.44	24	4,330	16	144	640	38,100	17,889	42,400	9,520	19,526
May	3.51	.78	6	1,800	31	231	484	29,800	34,761	156,000	10,800	25,650
June	4.48	.69	9	3,110	30	190	322	19,200	34,674	197,000	8,840	34,015
July	33.32	.53	26	98,500	14	158	848	52,100	26,078	84,200	7,620	33,958
Aug.	10.73	.53	8	14,900	31	210	513	31,500	20,123	50,400	7,620	22,022
Sept.	4.28	.45	17	3,260	6	191	339	20,200	42,239	324,420	6,190	25,492
Oct.	5.98	.52	24	5,540	21	199	365	22,400	52,922	486,000	9,520	68,100
Nov.	1.01	.67	1	359	30	226	276	16,400	28,865	209,000	10,300	35,567
Dec.	.79	.64	31	260	24	203	219	13,400	23,979	91,800	12,200	25,333
Yearly	33.32	.44		98,500		144	390	282,600	343,967	1,330,900	167,420	354,956

* And other days

GOODENOUGH SPRING NEAR COMSTOCK, TEXAS

DESCRIPTION: Staff gage located 4,000 feet above confluence with Rio Grande and 11.75 miles southwest of Comstock, Val Verde County, Texas. The stream from this spring enters the Rio Grande 664.9 river miles below the American Dam at El Paso. Zero of gage is 968.42 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 21 meter measurements during the year with the discharge estimated between measurements. Records available: February 23, 1929, to December 1949.

REMARKS: The flow of this spring is very uniform and not modified by diversions or storage. Backwater reaches the station when the Rio Grande reaches a discharge of about 35,000 second-feet near this spring. A maximum gage height of 17.30 feet was reached by backwater on September 1, 1932.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 846 second-feet on September 18, 1941 with a gage height of 4.57 feet. Min. 75.7 second-feet on August 28, 1944 with a gage height of .47 feet.

Average Flow in Second-Feet

Daily:	Max. # 455	Oct. 1, 1932	Min. 77.2	Aug. 28, 1944
Monthly:	Max. * 421	Oct. 1932	Min. 88.6	Aug. 1944
Yearly:	Max. 266	1933	Min. 108	1944

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	# 116	# 107	# 133	# 155	# 171	# 161	# 147	# 130	# 141	# 138	# 135	# 125
2	# 116	# 107	# 134	# 154	# 173	# 161	# 147	# 130	# 141	# 138	# 135	# 125
3	# 116	# 106	# 136	# 154	# 174	# 161	# 148	# 130	# 141	# 138	# 135	# 125
4	# 116	# 106	# 137	# 154	# 175	# 161	# 148	# 130	# 141	# 138	# 134	# 125
5	# 115	# 106	# 139	# 153	# 176	# 162	# 148	# 131	# 141	# 137	# 134	# 125
6	# 115	# 106	# 141	# 153	# 177	# 162	# 148	# 131	# 141	# 137	# 134	# 125
7	# 115	# 105	# 142	# 152	# 178	# 162	# 148	# 132	# 141	# 137	# 134	# 125
8	# 114	# 105	# 144	# 152	# 180	# 161	# 148	# 133	# 141	# 137	# 134	# 125
9	# 114	# 105	# 145	# 152	# 181	# 160	# 148	# 133	# 141	# 137	# 133	# 124
10	# 114	# 104	# 147	# 151	# 182	# 159	# 148	# 134	# 141	# 137	# 133	# 124
11	# 114	104	# 148	# 151	# 180	# 158	# 148	# 134	# 141	# 137	# 132	# 124
12	# 113	# 106	# 150	# 150	# 179	# 157	# 148	# 135	# 141	# 137	# 132	# 124
13	# 113	# 107	# 152	# 150	# 177	# 156	# 148	# 136	# 141	# 137	# 131	# 124
14	# 113	# 109	# 153	# 151	# 175	# 154	# 148	# 136	# 141	# 136	# 130	# 123
15	# 112	# 110	# 155	# 152	# 174	# 153	# 146	# 137	# 141	# 136	# 130	# 123
16	# 112	# 112	# 156	# 154	# 172	# 152	# 145	# 138	# 140	# 136	# 129	# 123
17	# 112	# 114	# 158	# 155	# 170	# 151	# 143	# 138	# 140	# 136	# 128	# 123
18	# 111	# 115	# 158	# 156	# 169	# 150	# 142	# 139	# 140	# 136	# 128	# 123
19	# 111	# 117	# 158	# 157	# 167	# 149	# 140	# 139	# 140	# 136	# 127	# 122
20	# 111	# 118	# 158	# 158	# 166	# 148	# 139	# 140	# 140	# 136	# 127	# 122
21	# 111	# 120	# 157	# 159	# 164	# 147	# 137	# 141	# 140	# 136	# 126	# 122
22	# 110	# 121	# 157	# 161	# 162	# 147	# 136	# 141	# 140	# 136	# 126	# 122
23	# 110	# 123	# 157	# 162	# 161	# 147	# 134	# 142	# 140	# 136	# 126	# 122
24	# 110	# 125	# 157	# 163	# 159	# 147	# 133	# 142	# 140	# 136	# 126	# 122
25	# 109	# 126	# 157	# 164	# 159	# 147	# 131	# 142	# 140	# 135	# 126	# 122
26	# 109	# 128	# 156	# 165	# 159	# 147	# 131	# 142	# 139	# 135	# 126	# 122
27	# 109	# 129	# 156	# 167	# 160	# 147	# 131	# 142	# 139	# 135	# 126	# 121
28	# 108	# 131	# 156	# 168	# 160	# 147	# 131	# 142	# 139	# 135	# 126	# 121
29	# 108	# 156	# 169	# 160	# 147	# 131	# 142	# 139	# 135	# 125	# 121	
30	# 108	# 156	# 170	# 160	# 147	# 130	# 142	# 138	# 135	# 125	# 121	
31	# 107	# 155	# 161	# 161	# 130	# 141	# 130	# 141	# 135	# 125	# 121	
Sum		*3,172	*4,712	*4,608	*4,245	*4,226	*3,816					
*3,472		*4,664	*5,261	*4,380	*4,209	*4,209	*3,893					

Current Year 1949

Period March 1929-1949

Acre-Feet

Month	Extreme Gage Feet		# Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			
	High	Low	Day	Day			Normal	Maximum	Minimum	
Jan.	# 116	# 107	31	# 107	* 112	* 6,890	8,598	19,620	6,130	7,526
Feb.	28	# 131	\$10	# 104	* 113	* 6,290	7,624	17,030	5,350	6,637
Mar.	* 17	* 158	1	# 133	* 150	* 9,250	8,277	17,770	5,900	7,397
Apr.	30	# 170	\$12	# 150	* 157	* 9,350	7,937	16,580	5,560	7,323
May	10	* 182	\$24	* 159	* 170	* 10,400	8,640	16,840	5,850	8,098
June	4	162	\$21	* 147	* 154	* 9,140	8,639	16,040	5,310	7,847
July	* 3	# 148	\$30	# 130	* 141	* 8,690	9,223	16,460	5,930	8,760
Aug.	* 23	* 142	1	# 130	* 137	* 8,420	8,839	15,840	5,450	8,296
Sept.	* 1	# 141	30	# 138	* 140	* 8,350	9,600	25,000	6,550	8,429
Oct.	* 1	# 138	\$25	# 135	* 136	* 8,380	9,906	* 25,870	6,840	8,822
Nov.	* 1	# 135	\$29	# 129	* 130	* 7,720	9,130	21,850	6,540	8,132
Dec.	* 1	# 125	\$27	# 121	* 123	* 7,570	8,961	20,470	6,380	7,997
Yearly			* 182	# 104	* 139	* 100,450	105,374	192,840	78,490	95,264

* Estimated * Partly estimated # Mean daily \$ And other days

DEVILS RIVER NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder on main highway bridge, 12 miles northwest of Del Rio, Texas, and 4.5 miles above confluence with the Rio Grande. Devils River enters the Rio Grande 680.1 river miles below the American Dam at El Paso, Texas. Zero of gage is 951.80 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 10 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. 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, 1949 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 two power dams with a combined hydroelectric generating capacity of 3,100 kva, the operation of which began in 1929.

EXTREME FLOWS: The highest recorded gage height was on September 1, 1932, when the extreme was 41.0 feet at the present station and the extreme flow was 597,000 second-feet. Zero flow sometimes occurs for a few hours at this station.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	290	258	1,020	561	1,380	520	541	576	574	538	624	458
2	291	275	933	550	1,130	510	472	551	574	505	624	457
3	297	253	881	543	1,010	499	561	538	538	506	588	499
4	290	269	854	559	9,480	363	572	529	538	561	588	467
5	224	259	854	524	12,500	490	563	524	538	510	571	466
6	225	269	853	525	3,950	527	535	590	537	547	552	465
7	226	270	767	517	1,380	486	453	689	555	583	552	443
8	229	271	766	512	921	526	517	26,900	554	568	552	573
9	234	268	825	488	769	526	443	6,930	554	570	552	649
10	255	262	602	519	697	567	490	1,480	554	537	551	526
11	263	243	741	483	631	567	500	987	553	489	551	473
12	237	224	633	442	620	557	436	862	483	491	551	444
13	255	225	707	504	609	569	465	791	500	493	498	470
14	252	226	745	492	598	462	423	768	705	493	533	455
15	244	219	598	493	586	463	482	737	669	492	533	441
16	274	216	669	452	586	512	407	726	3,440	492	533	440
17	346	224	701	447	586	531	434	704	998	492	532	430
18	252	225	650	487	585	513	435	694	762	492	514	437
19	232	229	622	617	582	514	486	694	780	505	514	480
20	231	224	678	503	574	504	* 404	684	729	505	514	435
21	231	228	716	508	563	505	" 435	674	685	549	496	433
22	238	276	699	621	562	381	" 435	674	664	833	482	415
23	260	5,060	646	2,010	553	477	" 465	663	600	809	481	431
24	266	2,020	607	4,120	583	501	" 490	629	565	796	494	404
25	295	8,930	639	5,660	572	1,000	* 527	629	547	4,470	478	428
26	294	3,020	646	1,880	546	925	24,600	629	547	2,520	477	154
27	257	1,860	551	1,280	523	631	3,230	628	549	1,080	476	126
28	258	1,180	555	1,170	480	589	857	628	551	820	489	400
29	269	548	1,940	541	580	680	610	552	731	473	440	
30	249	632	1,730	530	540	615	592	554	719	459	524	
31	251	516			530	585	592		606			593
Sum		27,483		31,167		16,335		53,908		24,322		14,156
8,015		21,854		45,157		42,538		20,947		15,832		

Current Year 1949

Period 1924-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949
	High	Low	Day	High	Low			Normal	Maximum	Minimum	
Jan.	1.39	1.02	4	465	6	78.0	15,900	22,560	45,250	12,700	13,567
Feb.	7.15	1.01	25	25,700	1	110	982	54,500	21,554	54,500	12,000
Mar.	1.87	1.18	1	1,060	31	177	705	43,300	21,955	43,300	11,100
Apr.	4.63	1.11	25	10,500	7	117	1,040	61,800	24,704	67,800	9,910
May	7.24	.87	4	26,300	28	24.0	1,460	89,600	42,963	356,900	10,500
June	2.21	.95	25	1,570	7	36.8	544	32,400	51,396	380,000	11,100
July	15.61	1.19	26	128,000	19	179	1,370	84,400	51,842	377,000	13,900
Aug.	13.27	1.02	8	91,700	5	94.0	1,740	107,000	27,182	107,000	12,100
Sept.	4.03	1.01	16	7,450	1	198	698	41,500	79,955	895,990	11,200
Oct.	3.68	1.20	25	5,930	21	332	785	48,200	48,652	349,000	13,200
Nov.	1.50	1.36	12	673	12	455	528	31,400	25,494	60,300	13,900
Dec.	1.87	1.31	8	1,100	30	366	466	28,700	23,622	49,520	13,500
Yearly	15.61	.87		128,000		24.0	882	638,700	441,879	1,284,080	180,000
	Partly estimated			Estimated							365,133

ARROYO LAS VACAS NEAR VILLA ACUNA, COAHUILA

DESCRIPTION: water-stage recorder and cable with sit-down cable car, located 1.5 miles upstream from Villa Acuña, Coahuila and 1.8 miles upstream from the confluence of Arroyo las Vacas with the Rio Grande at a point just above the Del Rio-Villa Acuña International Bridge. This confluence is 693.5 river miles below the American Dam at El Paso, Texas. Zero of the gage is 884.15 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 168 meter measurements during the year, 184 by the Mexican and 4 by the United States Section of this Commission, and a continuous record of gage heights. Computations by shifting channel methods. Records available: occasional estimates from June 1935 to March 19, 1938, continuous record March 20, 1938 to December 31, 1949.

REMARKS: The low flow of this stream is from springs. Backwater from the Rio Grande reaches this station when the stage at Del Rio Station reaches about 21.0 feet, or a flow of about 110,000 second-feet.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 25,640 second-feet on October 3, 1944 with a gage height of 17.45 feet. Min. .7 second-feet on various days in November 1938 and on March 16, 1940 with a gage height of .98 foot.

Average Flow in Second-Feet

Daily:	Max.	3,530	Oct. 3, 1944	Min.	.7	Nov. 1938 & March 1940
Monthly:	Max.	153	Oct. 1944	Min.	1.1	Jan. 1938
Yearly:	Max.	25.9	1944	Min.	7.1	1939

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	7.4	49.8	10.2	23.3	7.8	5.0	3.9	7.1	13.1	10.6	9.9
2	3.5	6.7	34.3	15.9	20.5	5.3	7.1	3.9	6.7	13.1	9.9	6.7
3	3.5	7.1	39.6	16.6	20.8	5.7	5.7	3.5	7.4	9.5	9.9	6.7
4	3.9	7.1	38.5	12.0	20.8	6.0	6.0	3.9	5.3	11.3	9.5	6.3
5	3.9	6.7	39.9	9.2	19.8	6.0	5.7	3.9	6.0	9.5	6.7	6.3
6	3.9	6.3	28.3	10.2	17.3	6.0	5.3	7.1	7.1	8.8	8.8	6.0
7	3.5	6.7	29.3	10.6	16.2	5.7	3.9	1,560	5.7	8.1	8.8	5.7
8	3.5	6.7	41.3	7.4	15.5	5.3	3.9	45.6	5.7	8.1	9.2	5.7
9	3.9	6.0	27.5	7.1	7.8	5.3	4.2	32.1	5.3	8.1	9.5	5.7
10	3.9	6.3	26.8	6.7	10.2	5.3	4.3	17.7	5.3	8.1	9.2	5.7
11	4.2	6.3	25.8	6.0	13.1	10.6	4.6	19.4	4.9	9.2	6.4	6.0
12	4.2	6.3	25.8	7.4	8.8	6.0	4.6	13.8	4.9	7.1	6.7	6.0
13	4.2	6.7	26.1	8.8	13.1	6.4	4.3	13.1	5.3	6.7	7.1	6.0
14	3.9	6.3	26.1	6.4	10.9	3.2	4.3	18.4	5.3	6.4	7.1	6.0
15	3.9	6.3	21.9	7.4	8.8	2.8	4.3	17.0	5.7	6.0	8.1	6.4
16	3.9	5.7	18.0	6.4	12.4	4.6	4.2	12.0	19.6	6.0	6.4	7.1
17	3.9	5.7	21.9	8.1	8.8	6.0	4.2	13.1	14.1	5.7	6.4	7.1
18	3.9	5.7	18.0	6.4	11.3	6.0	4.2	12.7	10.6	8.1	6.0	7.4
19	3.9	5.3	18.4	22.2	10.2	2.8	4.2	12.7	75.2	7.8	6.0	7.4
20	4.2	5.3	27.5	7.1	9.2	2.8	4.2	12.4	67.5	8.8	5.7	7.4
21	3.9	4.9	19.4	5.3	11.7	2.8	3.5	12.4	18.0	6.7	5.7	7.4
22	3.9	13.4	23.0	6.4	14.5	5.7	3.5	12.0	13.1	6.4	6.0	7.4
23	3.9	2,090	18.0	308	17.0	5.3	3.5	10.9	14.1	9.2	6.4	7.1
24	3.5	109	19.1	554	16.2	5.3	3.5	9.9	15.2	6.4	6.7	7.1
25	4.9	477	20.5	47.7	7.8	5.3	5.0	10.9	16.6	6.4	6.7	6.7
26	6.0	82.3	8.5	32.1	7.4	25.4	5.7	12.0	11.7	6.0	6.7	6.7
27	6.4	57.6	7.8	26.8	6.7	9.9	3.2	12.4	10.6	6.4	6.7	6.7
28	6.7	41.3	10.9	30.0	11.7	7.8	3.5	8.1	14.5	9.5	6.7	6.7
29	7.1	13.1	30.0	6.0	6.4	3.5	8.5	13.8	12.7	6.7	5.7	5.7
30	7.1	9.9	26.5	6.4	5.7	3.5	7.8	13.4	11.7	7.1	9.2	17.3
31	7.4	12.7	12.7	5.3			3.9	7.4	10.9			
Sum	3,002.1		1,258.9		189.2			1,938.5		261.8		219.5
	138.0		747.7		389.5			136.5		592.1		223.4

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet				
	High		Low	High				Normal	Maximum	Minimum		
	High	Low		Day	Day							
Jan.	2.03	1.57	25	11.3	#	3.2	4.5	274	401	910		
Feb.	8.73	1.54	23	9,610	#	4.9	107	5,950	885	5,950		
Mar.	1.54	1.31	1	71.3	28	7.1	24.1	1,480	915	2,600		
Apr.	5.41	1.25	23	2,860	21	5.3	42.0	2,500	1,192	4,580		
May	1.28	1.15	1	23.3	31	5.3	12.6	775	1,269	4,310		
June	1.57	1.12	26	57.6	#	2.8	6.3	375	950	3,900		
July	1.48	1.05	26	44.1	27	3.2	4.4	271	1,869	8,230		
Aug.	10.37	1.05	7	14,690	3	3.5	62.5	3,850	1,055	3,850		
Sept.	4.30	1.41	16	1,660	#	4.9	19.7	1,170	1,600	6,850		
Oct.	1.57	1.38	23	33.5	17	5.7	8.4	519	1,179	9,390		
Nov.	1.44	1.38	1	10.6	#	5.7	7.4	443	426	1,670		
Dec.	1.51	1.38	#	17.3	#	5.7	7.1	435	369	704		
Yearly	10.37	1.05		14,690		2.8	24.9	18,040	12,110	18,808		
										5,130		

Various days of the month * Estimated

RIO GRANDE NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder located on the downstream side of a pier of the international highway bridge between Del Rio, Texas, and Villa Acuña, Coahuila and 693.6 river miles below the American Dam at El Paso, Texas. Measurements from highway bridge. Zero of gage is 864.30 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 33 meter measurements during the year, 30 by the United States and 3 by the Mexican Section of this Commission, and a continuous record of gage heights. Computations by shifting channel methods. Records available: July 2, 1941 to December 1949. Records are also available for a station 11 miles upstream from May 1900 to April 1915 and for a station 7.5 miles upstream at McKee's Switch, from December 1919 to March 1920, and for a station 900 feet above the international highway bridge from December 1923 to July 2, 1941.

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

EXTREME FLOWS: The highest recorded gage height was on September 1, 1932, when the gage height was 34.5 feet with a discharge of 605,000 second-feet. This is the greatest rate of discharge recorded at any point on the Rio Grande. The lowest flow of record was on May 8, 1948, when the gage height was .40 foot and the flow was 732 second-feet.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,500	1,840	4,370	1,750	4,430	1,560	2,100	5,280	3,000	3,560	3,140	2,390
2	1,480	1,910	4,080	1,700	3,420	1,610	2,670	4,670	2,610	3,480	3,100	2,340
3	1,480	1,890	3,870	1,680	2,920	1,610	2,150	3,940	2,340	3,460	3,040	2,460
4	1,420	2,150	3,660	1,660	9,770	1,530	1,930	4,310	2,170	3,480	3,030	2,560
5	1,400	2,360	3,550	1,620	14,700	1,710	1,730	4,010	2,050	3,540	2,940	2,530
6	1,400	2,490	3,550	1,570	8,190	1,760	1,600	6,170	1,970	3,760	3,010	2,510
7	1,400	2,510	3,270	1,550	5,210	1,590	1,510	7,500	1,940	5,960	5,000	2,470
8	1,950	2,080	3,060	1,710	4,160	1,940	1,570	31,100	2,000	3,590	2,930	2,460
9	2,060	2,020	3,220	1,730	3,780	5,100	1,440	34,500	1,820	3,280	2,920	3,050
10	1,860	2,000	2,910	1,580	3,270	5,830	1,390	11,200	1,920	2,940	2,800	2,660
11	1,760	2,140	2,930	1,470	2,700	3,630	1,400	9,090	1,900	2,810	2,870	2,600
12	1,710	2,240	2,780	1,420	2,630	3,340	1,390	10,300	2,650	2,810	2,910	2,510
13	1,660	2,240	2,760	1,400	2,880	12,800	1,470	8,680	3,080	2,750	2,920	2,330
14	1,650	2,180	2,760	1,400	2,440	6,060	1,430	8,310	9,000	2,650	2,970	2,230
15	1,620	2,140	2,520	1,350	2,430	4,560	1,540	7,820*	9,620	2,550	3,030	2,220
16	1,580	2,180	2,570	1,330	2,420	4,150	2,380	6,640	15,700	2,490	2,970	2,200
17	1,810	2,280	2,780	1,300	2,340	3,160	1,810	4,910	12,300	2,470	2,960	2,200
18	1,740	2,320	2,900	1,340	4,160	2,680	1,560	4,260	11,800	2,360	2,980	2,270
19	1,720	2,320	2,800	7,400	3,040	2,330	1,460	3,890	7,400	2,350	2,820	2,220
20	1,700	2,410	2,950	3,340	2,470	2,070	1,380	3,650	6,200	2,330	2,790	2,270
21	1,650	2,450	2,920	4,180	2,410	1,870	1,510	3,570	5,270	2,370	2,720	2,240
22	1,660	2,900	2,730	5,110	2,340	1,670	1,470	3,990	4,750	3,640	2,690	2,230
23	1,750	14,700	2,520	6,780	2,060	1,590	1,500	3,930	4,820	3,000	2,620	2,240
24	1,770	6,530	2,310	14,700	1,950	1,650	1,790	3,440	4,200	5,280	2,700	2,280
25	1,800	42,800	2,300	14,500	1,850	2,170	3,420	3,090	3,980	18,900	2,620	2,210
Sum	131,640	112,050	97,280	214,070	142,990	127,950	74,320					
	52,200	88,310	109,010	130,710								85,050

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949
	High		Low	Day	Day			Normal	Maximum	Minimum	
	High	Low	Day	Day	Day			Acre-Feet			
Jan.	1.94	1.38	8	2,290	4	1,300	1,680	104,000	162,383	344,000	98,200
Feb.	19.50	1.64	25	102,000	1	1,690	4,700	261,000	145,211	261,000	96,200
Mar.	2.81	1.61	1	4,400	31	1,590	2,850	175,000	139,987	224,670	94,700
Apr.	8.15	1.32	19	21,500	16	1,150	3,740	222,000	128,963	222,000	* 70,200
May	9.45	1.56	4	27,500	27	1,580	3,520	216,000	201,748	742,000	68,200
June	7.65	1.48	27	17,800	4	1,480	3,240	193,000	220,524	704,000	174,617
July	21.12	1.24	26	107,000	20	1,270	4,220	259,000	255,447	* 1,228,000	* 82,400
Aug.	20.52	2.08	8	97,900	30	2,260	6,910	425,000	271,964	865,000	* 74,700
Sept.	9.65	1.75	16	26,000	9	1,780	4,770	284,000	532,337	2,754,590	335,933
Oct.	9.12	2.07	25	23,900	20	2,270	4,130	254,000	394,114	1,634,000	110,000
Nov.	2.47	2.06	1	3,200	29	2,380	2,840	169,000	181,912	467,000	108,000
Dec.	2.61	1.92	9	3,490	16	2,180	2,400	147,000	162,775	295,180	102,000
Yearly	21.12	1.24		107,000		1,150	3,740	2,709,000	2,797,365	6,041,720	1,639,000
											2,722,108

* And other days * Partly estimated ** Estimated

SAN FELIPE CREEK NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder at Silos farm road bridge 1.75 miles south of Del Rio, Texas, 2 miles above the confluence with the Rio Grande which is 1.6 river miles below the Del Rio gaging station on the Rio Grande. This stream enters the Rio Grande 695.2 river miles below the American Dam at El Paso, Texas. Low and medium flow measurements by wading or from bridge. High flows by slope-area measurements. Zero of the gage is 875.05 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 12 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: September 1, 1931 to December 31, 1949.

REMARKS: The flow of this spring-fed creek is greatly modified by municipal diversions at Del Rio and by irrigation diversions above this station. Backwater from the Rio Grande reaches this station when the stage at Del Rio Station reaches 15 feet or a flow of about 60,000 second-feet.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 45,000 second-feet on June 14, 1935, with a gage height of 23.20 feet. Min. 2.2 second-feet on December 19, 1934.

Average Flow in Second-Feet

Daily:	Max.	#	16,200	June 14, 1935	Min.	2.4	Dec. 41, 1934
Monthly:	Max.	*	805	June, 1935	Min.	8.8	Feb. 1935
Yearly:	Max.	*	136	1935	Min.	30.7	1934

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	47.5	62.2	86.8	79.8	101	82.1	83.9	76.5	81.2	102	90.1	88.4
2	57.1	61.2	85.6	80.8	98.0	81.1	84.7	75.5	81.3	97.8	90.1	88.5
3	57.1	61.2	84.4	80.8	99.0	80.1	86.5	76.5	81.4	94.0	90.2	88.7
4	57.2	61.2	84.2	81.9	100	79.2	85.4	77.3	81.4	92.5	91.4	84.2
5	55.4	61.3	84.0	80.8	101	80.2	85.3	78.3	81.5	94.6	91.4	84.4
6	54.6	61.3	82.8	81.9	97.9	81.2	81.3	82.1	80.6	97.9	91.4	85.7
7	53.7	61.3	82.6	81.8	95.5	82.3	79.3	263	79.2	96.5	93.8	89.2
8	53.0	61.3	82.4	82.9	96.1	89.9	80.0	280	80.9	95.0	98.6	92.9
9	53.8	62.4	82.3	#	81.8	95.7	* 106	126	80.9	93.5	97.4	96.5
10	53.9	60.4	84.3	#	80.7	95.1	* 89.3	78.0	94.1	82.9	94.5	93.1
11	53.9	60.2	86.2	#	78.6	91.7	89.1	78.0	92.2	83.0	95.4	97.5
12	55.1	60.1	85.9	#	76.6	91.3	91.1	79.9	91.3	85.8	95.4	96.3
13	54.0	59.9	87.0	*	72.5	90.3	88.8	82.7	91.4	133	94.3	97.5
14	54.0	58.8	77.3		71.4	88.3	88.7	79.8	89.5	131	95.5	96.4
15	53.3	58.7	70.1		70.4	89.4	83.5	76.0	82.8	90.0	90.8	95.0
16	54.1	58.4	71.9		67.4	90.5	80.5	75.1	82.8	714	90.8	94.0
17	53.4	58.3	70.9		68.4	90.5	82.2	76.9	82.9	106	92.1	96.1
18	53.4	58.2	69.9		68.4	89.5	83.0	76.9	83.0	100	90.9	91.8
19	53.5	58.0	70.9	*	209	88.5	83.9	75.0	82.1	317	90.9	89.4
20	54.3	57.8	72.8		92.4	84.5	82.7	75.0	82.2	164	94.5	99.5
21	56.2	55.9	73.8		95.7	81.6	83.6	74.9	85.2	144	98.1	89.5
22	60.8	106	73.8		94.6	84.6	88.5	74.9	92.1	106	100	90.7
23	59.0	1,150	74.9	*	224	86.6	87.3	78.7	88.3	172	93.2	97.0
24	59.0	95.3	75.9	#	1,330	85.7	85.1	83.3	88.3	100	94.5	98.2
25	71.0	1,450	75.9		135	84.7	108	98.9	87.4	98.4	98.2	94.6
26	64.6	108	76.8		110	87.7	246	93.0	87.5	98.1	98.2	98.1
27	62.8	92.5	76.8		106	83.8	94.3	90.1	88.5	97.9	95.3	98.0
28	62.9	90.3	76.8		104	85.8	91.2	88.0	88.6	97.6	104	95.0
29	62.9	75.8	102		84.8	93.0	87.1	87.1	99.8	104	96.3	98.0
30	62.1	74.8	103		83.9	91.9	84.2	86.8	86.8	101	104	93.0
31	62.1	76.8	103		83.9	91.9	80.3	84.0	97.2		118	114
Sum	4,350.2	*	4,092.6		2,773.8	3,053.9	3,776.1	3,064.1	2,807.6			2,959.3
	1,763.7	2,433.5			2,806.9	2,532.2						

Current Year 1949

Period Sept. 1931-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet			Normal 1938-1949	
	High	Low	Day	High	Low			Acre-Feet	Normal	Maximum	Minimum	
Jan.	1.62	.86	25	120	1	42.6	56.9	3,500	3,865	7,070	934	3,575
Feb.	12.77	.84	25	7,200	21	40.9	155	8,650	3,066	8,650	487	2,987
Mar.	1.39	1.16	1	90.1	18	65.1	78.5	4,830	2,543	4,830	798	2,502
Apr.	9.67	1.15	24	3,820	18	63.6	* 136	* 8,120	2,925	* 8,120	566	2,903
May	1.57	1.09	26	124	21	73.8	90.5	5,570	3,707	6,700	1,400	3,563
June	6.07	1.11	26	1,390	15	75.7	92.5	5,500	6,319	* 47,900	1,110	4,187
July	2.14	.94	25	195	19	70.3	81.7	5,020	3,512	* 8,800	1,080	3,539
Aug.	5.19	.95	8	984	2	70.9	98.5	6,060	3,140	6,060	838	2,982
Sept.	10.96	.98	16	5,020	5	75.8	126	7,490	4,486	19,100	872	3,338
Oct.	3.52	1.08	23	464	15	84.9	98.8	6,080	4,033	8,470	1,710	4,119
Nov.	1.21	1.07	8	101	419	85.9	93.6	5,570	3,192	5,570	526	3,045
Dec.	2.01	1.03	30	212	3	81.9	95.5	5,870	3,213	5,870	496	2,996
Yearly	12.77	.84		7,200		40.9	99.8	72,240	44,001	98,137	22,202	39,536

* Estimated * Partly estimated * And other days

PINTO CREEK NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder and concrete control dam, .6 mile below the Del Rio-Eagle Pass highway and 5.5 miles above the confluence with the Rio Grande. This creek enters the Rio Grande 717.7 river miles below the American Dam at El Paso, Texas. Zero of the gage is 854.61 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on a continuous record of gage heights and a stable rating curve, the low flow section of which was based on 23 meter measurements made during the year by wading below the dam, the medium flow section based on meter measurements made from the cable prior to its destruction in 1948 and the high flow section based on slope-area computations. Records available: November 22, 1928 to December 31, 1949.

REMARKS: The flow of this spring-fed creek is modified by small irrigation diversions above the gaging station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 186,000 second-feet on June 24, 1948 with a gage height of 32.0 feet. Min. Sometimes dry.

Average Flow in Second Feet

Daily:	Max.	*28,200	June 24, 1948	Min.	sometimes dry
Monthly:	Max.	*953	June 1948	Min.	sometimes dry
Yearly:	Max.	105	1932	Min.	1.8 1945

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.7	1.6	25.0	11.4	17.4	9.5	10.3	5.8	5.5	5.8	10.8	10.3
2	.7	1.7	21.7	11.4	15.8	9.0	10.2	4.8	5.2	5.7	11.0	11.2
3	.8	1.8	19.8	12.3	15.1	8.7	13.0	5.0	5.0	6.2	10.9	13.3
4	.7	1.7	18.1	13.2	15.1	8.5	13.0	8.3	4.8	6.8	11.1	12.3
5	.7	1.7	17.2	12.4	15.9	7.9	11.5	13.1	4.6	7.0	10.4	12.1
6	.6	1.7	16.4	13.3	15.1	7.9	10.1	6.3	4.5	6.6	10.0	12.3
7	.6	1.7	13.9	13.4	15.1	8.6	9.4	65.2	4.5	6.5	9.6	12.3
8	.6	1.6	13.1	13.4	15.1	21.2	8.4	318	4.5	6.4	9.5	12.6
9	.7	1.5	12.2	13.4	15.1	34.8	7.5	31.7	4.3	6.3	9.9	12.7
10	.8	1.2	12.1	13.4	20.7	19.2	7.1	20.9	4.1	6.5	10.0	12.7
11	1.2	1.1	11.3	14.9	16.7	14.3	6.9	15.7	4.5	7.3	10.4	13.4
12	1.7	1.2	12.0	14.9	15.1	11.4	6.2	12.2	4.5	7.2	10.0	12.9
13	1.3	1.3	12.8	14.9	14.3	11.0	5.9	10.7	4.5	6.6	9.9	12.2
14	1.6	1.3	12.7	14.9	14.3	10.7	8.6	10.0	4.5	7.5	10.1	13.4
15	1.8	1.1	11.8	14.1	14.3	11.2	8.3	9.3	4.3	7.4	10.2	13.9
16	3.0	.8	11.8	14.1	14.3	10.9	7.0	8.7	17	7.4	10.4	13.9
17	2.1	1.0	12.5	14.1	15.1	9.1	7.2	8.0	10.0	7.6	10.9	14.1
18	1.8	1.1	11.6	14.8	16.7	8.3	6.5	7.9	8.0	7.8	10.9	14.1
19	1.4	1.0	10.0	291	15.2	8.3	6.0	7.9	19.8	7.8	10.9	14.1
20	.9	1.0	11.5	21.8	15.4	7.9	5.6	7.9	13.4	7.6	10.9	14.1
21	.9	1.0	13.9	19.8	14.7	7.6	5.2	7.5	9.1	7.6	10.2	13.6
22	1.0	11.1	13.8	19.8	14.0	7.4	4.7	7.2	8.6	8.6	9.4	12.4
23	1.7	469	13.1	22.6	13.4	7.1	4.7	7.2	9.3	39.0	9.6	11.9
24	1.6	170	12.4	42.1	12.7	6.9	4.4	7.2	24.1	9.9	12.2	
25	1.8	1,780	12.4	22.9	12.0	11.5	19.7	6.9	7.1	21.4	10.5	13.1
26	2.5	361	11.7	20.9	12.2	43.1	26.3	6.9	6.7	18.8	11.0	13.6
27	1.7	51.4	10.2	18.9	11.9	37.4	9.5	6.6	13.4	10.5		13.6
28	1.7	33.9	9.8	20.0	11.6	20.8	8.2	6.5	6.6	12.5	9.9	12.9
29	1.6		11.1	20.0	11.3	15.1	6.9	6.3	6.2	11.8	9.7	13.6
30	1.6		11.2	19.0	11.0	11.7	5.7	5.8	5.5	11.9	9.7	17.1
31	1.7		11.3		10.4		5.6	5.7	*	10.7		17.6
Sum		2,904.5		783.1		407.0		651.2		317.8		409.5
		41.5		418.4		447.0		269.6		341.1		308.2

Month	Extreme Gage Feet			Extreme Second-Feet			Average Second-Feet	Total Acre-Feet	Period Dec. 1928-1949			Acre-Feet Normal 1938-1949			
	High		Day	High		Day			Normal	Maximum	Minimum				
	High	Low		Day	Day										
Jan.	3.22	2.95	16	4.2	4.5	.6	1.3	82.3	400	2,110	0	202			
Feb.	10.92	3.05	25	8,490	22	.6	104	5,760	654	5,760	0	731			
Mar.	3.62	3.44	1	26.4	20	9.5	13.5	830	516	2,500	0	325			
Apr.	6.95	3.45	19	2,200	1	10.6	26.1	1,550	762	3,600	43.0	671			
May	3.65	3.37	10	31.1	31	9.7	14.4	887	2,519	20,500	28.0	1,554			
June	4.17	3.22	26	108	24	6.6	13.6	807	* 4,867	* 56,700	0	* 5,594			
July	4.57	3.07	25	229	25	4.1	8.7	535	2,908	30,000	0	4,076			
Aug.	6.74	3.09	8	2,000	42	4.3	21.0	1,290	2,655	48,700	0	391			
Sept.	6.99	3.09	16	2,240	10	3.8	11.4	677	1,699	17,300	0	400			
Oct.	4.22	3.09	23	120	2	5.1	10.3	650	772	4,000	0	313			
Nov.	2.98	2.86	42	11.2	422	9.2	10.3	611	364	2,150	0	173			
Dec.	3.28	2.94	30	19.9	1	10.3	13.2	812	451	2,180	0	205			
Yearly	10.92	2.94		8,490		.6	20.0	14,471.3	*18,367	76,259.3	1,325.2	*14,632			

* Partly estimated \$ And other days

RIO SAN DIEGO AT JIMENEZ, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car. Masonry and concrete Cipoletti weir control for measuring discharges up to 700 second-feet. The station is located 4.4 miles west of Jiménez, Coahuila, and 5.0 miles above the confluence with the Rio Grande. This stream enters the Rio Grande 722.4 river miles below the American Dam at El Paso, Texas. Zero of the gage is 828.90 feet above mean sea level, U.S.C.& G.S. datum.

RECORDS: Based on 4 meter measurements at high flow during the year, the weir discharge table, and a continuous record of gage heights. Records available: 1922 to 1949. The records from 1922 to September 1932 are considered doubtful.

REMARKS: The flow of this spring-fed stream is modified by storage reservoirs and by irrigation diversions above this station.

COMPARATIVE FLOWS FROM RECORDS: #Momentary Peak: Max. about 75,200 second-feet on September 18, 1941, with a gage height of 20.96 feet. Min., the river was dry on several occasions from April to June 1939.

Average Flow in Second-Feet

Daily:	Max.	* 23,200	Sept. 18, 1941	Min.	sometimes dry
Monthly:	Max.	2,380	Oct. 1932	Min. 18.7	April 1939
Yearly:	Max.	527	1935	Min. 37.9	1939

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	114	114	611	284	837	367	209	209	368	284	265	143
2	101	114	558	284	791	346	192	192	367	284	265	129
3	101	114	533	304	770	325	192	192	367	284	265	129
4	100	114	508	304	770	304	209	192	367	264	265	129
5	100	100	484	304	745	304	192	192	367	264	265	129
6	100	100	484	284	724	304	175	192	346	264	246	129
7	100	100	459	264	696	284	175	1,480	346	264	245	129
8	100	100	434	245	667	346	175	1,510	304	264	245	129
9	87.2	87.2	509	245	667	558	175	826	325	264	227	129
10	87.2	87.2	509	209	667	346	175	727	325	264	227	129
11	87.2	87.2	509	209	639	304	175	667	304	264	209	129
12	100	87.2	509	209	639	304	175	639	304	264	192	129
13	100	87.2	508	209	611	304	175	586	304	265	192	129
14	100	87.2	484	209	611	284	175	558	304	265	192	128
15	100	87.2	459	209	586	284	192	533	304	265	175	128
16	114	87.2	459	209	558	284	192	509	459	265	159	128
17	114	87.2	459	192	558	284	192	509	325	265	145	128
18	114	87.2	459	192	558	265	192	484	325	265	129	128
19	114	87.2	434	175	533	265	209	484	304	265	129	114
20	114	87.2	434	175	533	246	209	484	304	264	129	114
21	114	87.2	413	175	509	246	192	484	325	304	143	114
22	114	129	413	159	509	245	192	484	325	325	143	128
23	114	2,620	388	209	484	245	192	484	325	413	143	128
24	114	1,040	388	459	459	227	175	484	325	388	143	114
25	114	1,290	367	561	434	227	175	484	325	346	143	114
26	129	943	316	724	413	227	227	484	304	325	143	114
27	129	819	325	745	413	227	192	484	284	284	143	114
28	129	724	325	1,200	413	209	192	434	284	284	143	114
29	129		284	1,060	388	209	209	388	284	284	143	114
30	129		265	908	367	209	209	434	284	265	143	114
31	114		265	367	367	209	209	413	265	265	143	114
Sum	9,554.6	13,632	10,915	17,916	8,579	5,919	16,222	9,784	8,870	5,575	3,870	

Current Year 1949

Period Oct. 1932-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949	
	High		Low	Day	Day			Normal	Maximum	Minimum		
	High	Low	Day	Day	Day			Day	Day	Day		
Jan.	3.05	2.95	#	129	#	87.2	109	6,700	7,786	36,430	2,910	5,642
Feb.	7.84	2.92	23	6,460	14	74.9	341	18,950	6,199	25,760	1,970	5,213
Mar.	3.84	3.31	1	639	#	265	440	27,040	6,080	27,040	2,140	5,257
Apr.	5.02	5.12	28	1,670	22	159	364	21,650	6,117	21,650	1,110	5,112
May	4.13	3.44	1	862	31	346	578	35,540	*15,441	* 120,200	1,290	9,452
June	4.46	3.22	8	1,120	#	209	286	17,020	11,476	62,240	1,420	8,379
July	3.77	3.08	26	586	#	143	191	11,740	10,694	34,430	1,210	11,303
Aug.	6.99	3.18	7	4,840	#	192	523	32,180	9,104	32,180	2,030	8,710
Sep.	4.30	3.35	16	978	#	284	326	19,410	*17,091	* 81,620	2,120	*16,087
Oct.	3.71	3.31	23	533	#	264	286	17,590	21,892	146,640	1,950	16,163
Nov.	3.31	3.05	#	265	#	129	186	11,060	13,597	68,290	1,960	11,076
Dec.	3.08	3.02	#	143	#	114	7,680	8,854	45,160	2,060	6,558	
Yearly	7.84	2.92		6,460		74.9	313	226,560	134,331	* 381,720	27,460	108,952

Various days of the month * Partly estimated @ Period October 1932-1949

RIO SAN RODRIGO NEAR EL MORAL, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car. Reinforced concrete control weir for measuring the flow up to 177 second-feet. This station is located 10.6 miles west of the town of El Moral, Coahuila, 19.3 miles northwest from Piedras Negras, Coahuila and 11.2 river miles above the confluence with the Rio Grande. Zero of the gage is 879.95 feet above mean sea level, U.S.C. & G.S. datum. This stream enters the Rio Grande 735.4 river miles below the American Dam at El Paso, Texas.

RECORDS: Based on 13 meter measurements at high flow during the year, the weir discharge table, and a continuous record of gage heights. Records available: 1922 to 1949. The records from 1922 to 1931 are considered doubtful.

REMARKS: The flow of this spring-fed stream is modified by irrigation diversions above this station.

COMPARATIVE FLOWS FROM RECORDS @: Momentary Peak: Max. 81,200 second-feet on September 7, 1932 with a gage height of 16.08 feet. Min. Frequently dry. Zero flow occurs at a gage height of 0.0 feet.

Average Flow of Second-Feet

Daily:	Max.	27,900	Sept. 7, 1932	Min.	frequently dry
Monthly:	Max.	4,270	Sept. 1932	Min.	Dry during July 1939
Yearly:	Max.	571	1932	Min.	10.3 1939

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	64.3	43.8	339	104	547	113	87.6	64.3	142	123	96.1	71.7
2	64.3	43.8	297	87.6	480	105	71.7	64.3	142	123	96.1	71.7
3	57.2	37.4	242	87.6	438	105	71.7	64.3	142	123	96.1	71.7
4	57.2	37.4	206	79.5	392	105	71.7	64.3	142	123	96.1	71.7
5	57.2	37.4	184	79.5	350	105	71.7	71.7	142	123	96.1	71.7
6	50.2	37.4	162	79.5	312	105	71.7	96.1	132	123	96.1	71.7
7	50.2	43.8	142	79.5	274	105	71.7	2,460	132	123	87.6	64.3
8	50.2	37.4	132	79.5	249	162	79.5	1,310	132	132	87.6	71.7
9	50.1	37.4	123	79.5	264	216	71.7	971	132	132	87.6	64.3
10	50.1	37.4	123	79.5	214	132	71.7	844	132	123	87.6	64.3
11	50.1	37.4	123	79.5	204	123	71.7	682	132	123	87.6	64.3
12	57.2	37.4	123	79.5	183	113	71.7	579	132	123	79.5	64.3
13	64.3	37.4	123	79.5	173	113	71.7	494	123	113	79.5	64.3
14	71.7	37.4	113	79.5	162	105	71.7	434	132	123	79.5	64.3
15	71.7	37.4	113	79.5	152	113	79.5	389	132	113	79.5	64.3
16	57.2	31.4	123	79.5	152	105	79.5	344	195	113	79.5	64.3
17	50.1	31.4	123	87.6	142	105	79.5	305	152	113	79.5	64.3
18	50.1	37.4	113	87.6	142	105	79.5	278	142	113	79.5	64.3
19	50.1	37.4	113	87.6	142	105	71.7	240	142	113	79.5	64.3
20	50.1	37.4	113	79.5	152	104	71.7	215	142	105	79.5	64.3
21	43.8	31.4	113	113	132	104	71.7	205	142	123	79.5	57.2
22	43.8	37.4	113	105	132	104	71.7	194	132	132	79.5	57.2
23	43.8	395	113	105	132	104	64.3	183	132	132	79.5	57.2
24	43.8	918	113	309	132	104	64.3	184	123	132	79.5	57.2
25	43.8	1,280	113	2,090	132	104	71.7	184	123	123	79.5	57.2
26	43.8	657	113	1,860	123	104	71.7	173	123	113	71.7	57.2
27	50.1	512	105	1,450	123	104	79.5	173	123	113	71.7	57.2
28	43.8	417	105	1,470	123	104	79.5	163	123	113	71.7	57.2
29	43.8	105	805	123	96.1	71.7	163	123	113	71.7	57.2	
30	43.8	105	636	113	96.1	64.3	152	123	105	71.7	57.2	
31	43.8	105	113	113	64.3	142	71.7	142	123	96.1	57.2	
Sum			5,003.0	10,670.5	3,368.2	11,886.0	3,758.1	1,967.0				
			1,611.7	4,333	6,492	2,263.6	4,061	2,486.1				

Current Year 1949

Period 1932-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949
	High		Low	Day	Day			Normal	Maximum	Minimum	
	High	Low	Day	Day	Low						
Jan.	.16	.33	#	71.7	#	43.8	52.0	3,200	3,666	14,850	171
Feb.	4.63	.26	25	2,890	#	31.4	179	9,920	3,017	11,580	555
Mar.	1.28	.59	1	352	#	105	140	8,590	2,760	9,900	576
Apr.	4.79	.49	28	3,020	#	79.5	356	21,160	3,222	21,160	382
May	1.80	.62	1	583	#	113	209	12,880	5,689	42,330	57.6
June	2.17	.56	8	805	#	96.1	112	6,680	6,831	41,660	30.0
July	.56	.43	1	96.1	#	64.3	383	4,490	3,985	12,170	0
Aug.	8.73	.43	7	7,420	#	64.3	135	23,580	5,110	23,580	38.9
Sept.	.95	.66	16	216	#	121	8,050	*22,171	* 253,960	383	6,089
Oct.	1.28	.56	23	347	31	96.1	121	7,450	11,062	81,360	9,591
Nov.	.56	.46	#	96.1	#	71.7	82.9	4,930	5,409	28,450	535
Dec.	.46	.39	#	71.7	#	57.2	63.5	3,900	4,487	19,060	131
Yearly	8.73	.26		7,420		31.4	159	114,830	*77,409	* 414,310	7,436
	# Various days of the month			* Partly estimated		• Period 1932-1949					56,430

RIO GRANDE AT EAGLE PASS, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch located .5 mile above the international highway bridge between Eagle Pass, Texas, and Piedras Negras, Coahuila and 754.6 river miles below the American Dam at El Paso, Texas. Zero of the gage is 682.91 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 121 meter measurements during the year, 120 by the Mexican and 1 by the United States Section of this Commission, and a continuous record of gage heights. Computations by shifting channel methods. Records available: May 1900 to March 1914; August 1914 to April 1916; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June 1922; September, November, and December 1923; January 1924 through December 1949.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. The cable and "A" frame on the Mexican bank were wrecked by the June 1948 flood. Subsequent high flow measurements were made from the railroad bridge and low flow measurements by wading 6,560 and 1,300 feet, respectively, below the station. High flow measurements from the cable were resumed October 31, 1949 when the cableway was repaired.

EXTREME FLOWS: The greatest recorded flow was on September 2, 1932, when the extreme gage height was 49.00 feet and the discharge was 569,000 second-feet. The lowest flow ever recorded was on June 22, 1948, when the extreme gage height was 1.08 feet and the extreme flow 551 second-feet.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,650	2,050	5,470	2,290	7,100	2,320	1,940	5,900	3,450	4,480	3,960	2,620
2	1,690	1,980	4,940	2,300	5,720	2,260	2,280	5,470	3,780	4,480	3,880	2,630
3	1,680	2,050	4,450	2,260	4,700	2,150	2,920	4,800	3,410	4,380	3,810	2,580
4	1,650	2,000	4,200	2,270	4,380	2,190	2,470	4,270	3,050	4,380	3,880	2,770
5	1,630	2,110	3,990	2,250	13,280	2,070	2,210	4,560	2,890	4,380	3,780	2,840
6	1,570	2,340	3,850	2,130	12,750	2,220	1,910	4,560	2,730	4,270	3,640	2,780
7	1,570	2,520	3,780	2,030	7,840	2,210	1,780	15,290	2,630	5,440	3,740	2,760
8	1,570	2,400	3,710	2,100	6,000	2,900	1,650	14,450	2,500	6,040	3,780	2,660
9	1,800	2,290	3,740	2,090	5,120	7,560	1,650	43,790	2,480	4,560	3,710	2,760
10	2,090	2,140	3,850	2,130	4,870	7,420	1,600	21,440	2,330	4,450	3,640	3,160
11	1,950	2,040	3,570	2,010	4,200	6,390	1,520	13,350	2,390	3,740	3,450	2,830
12	1,880	2,220	3,450	1,950	3,810	4,590	1,520	11,720	2,400	3,640	3,430	2,680
13	1,850	2,270	3,400	1,950	3,810	6,750	1,520	11,690	3,090	3,500	3,390	2,590
14	1,880	2,280	3,340	1,860	3,960	11,970	1,530	10,140	3,600	3,430	3,370	2,500
15	1,860	2,200	3,280	1,840	3,600	6,640	1,670	10,660	12,780	3,310	3,470	2,430
16	1,950	2,230	3,150	1,750	3,530	4,800	1,780	9,750	16,100	3,190	3,500	2,410
17	1,820	2,160	3,110	1,760	3,440	3,920	2,330	7,490	14,550	3,130	3,580	2,440
18	1,930	2,260	3,210	1,770	3,280	3,600	2,190	6,320	14,440	3,130	3,410	2,530
19	1,920	2,380	3,180	5,900	5,120	3,230	1,770	5,830	10,880	3,010	3,500	2,560
20	1,910	2,850	3,160	5,650	3,780	2,780	1,730	5,510	9,460	3,010	3,370	2,530
21	1,910	2,650	3,330	3,780	3,310	2,400	1,580	4,980	6,640	3,070	3,310	2,640
22	1,840	3,220	3,310	4,200	3,300	2,200	1,560	4,940	6,290	3,670	2,880	2,510
23	1,880	29,840	3,210	6,820	3,280	2,050	1,610	5,260	5,900	5,440	2,900	2,490
24	2,000	23,730	3,180	11,620	2,930	1,950	1,610	4,870	5,930	5,010	2,850	2,490
25	2,020	51,250	3,140	15,360	2,700	1,950	1,830	4,340	5,370	12,640	2,920	2,550
26	2,050	47,680	2,900	15,360	2,540	2,500	2,480	3,880	5,330	16,420	2,870	2,490
27	2,010	10,700	2,800	8,580	2,550	9,360	33,510	3,600	5,330	9,710	2,820	2,530
28	1,850	6,920	2,520	9,080	2,450	6,000	12,180	3,470	5,160	6,530	2,900	2,630
29	1,980	2,420	6,960	2,460	3,040	11,370	3,160	5,050	5,510	2,790	2,690	
30	1,940	2,380	6,430	2,580	2,200	8,260	3,120	4,660	4,700	2,550	2,890	
31	2,010	2,400	2,550	7,380	2,980				4,240			
Sum	200,760		136,480		121,620		261,690		156,890		82,330	
	57,340		106,420		140,940		121,340		174,580		100,880	

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total	Acres-Feet			Normal 1938-1949
	High		Day	High	Day			Normal	Maximum	Minimum	
	High	Low	Day	High	Day			Normal	Maximum	Minimum	
Jan.	3.28	2.72	31	2,420	8	1,470	1,850	113,700	176,830	365,000	96,060
Feb.	20.47	2.99	26	82,280	2	1,860	7,170	398,200	58,318	398,200	97,510
Mar.	4.56	2.95	1	5,860	30	2,260	3,430	211,100	148,050	247,440	93,510
Apr.	8.83	2.53	25	*20,520	7	1,630	4,550	270,700	139,118	270,700	60,250
May	8.79	2.82	5	20,380	28	2,300	4,550	279,600	236,420	*918,000	70,210
June	8.04	2.56	14	17,520	24	1,860	4,050	241,200	272,562	1,005,000	48,710
July	14.93	2.20	27	53,320	22	1,400	3,910	240,700	273,801	*1,225,000	89,040
Aug.	16.60	3.15	9	58,270	31	2,920	8,440	519,100	286,111	*947,000	86,400
Sept.	9.65	2.72	16	23,870	11	2,180	5,820	346,300	571,333	3,079,000	69,920
Oct.	8.99	3.02	25	21,150	19	2,890	5,060	311,200	433,923	1,680,300	108,100
Nov.	3.64	2.92	1	4,130	30	2,550	3,360	200,100	207,202	512,800	109,000
Dec.	3.48	2.82	10	3,570	16	2,350	2,660	163,300	178,294	369,760	105,620
Yearly	20,47	2.20		82,280		1,400	4,550	3,295,200	3,081,942	6,916,510	1,773,520
											2,905,127

* Partly estimated

RIO ESCONDIDO AT VILLA DE FUENTE, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car, located 3.1 miles southwest of Piedras Negras, Coahuila on the outskirts of Villa de Fuente, 5 miles above the confluence with the Rio Grande. This stream enters the Rio Grande 758.2 river miles below the American Dam at El Paso, Texas. Zero of the gage is 717.78 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 50 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: 1922 through 1949. The records from 1922 to September 1932 are considered doubtful.

REMARKS: Diversions and drainage returns modify the flow of this spring-fed stream at this station. When the flow of the Rio Grande at Eagle Pass reaches approximately 380,000 second-feet, Rio Grande backwater reaches this station.

COMPARATIVE FLOWS FROM RECORDS: • Momentary Peak: Max. 24,000 second-feet on June 29, 1936 with a gage height of 19.13 feet. Min. .35 second-foot on November 4, 1934 with a gage height of .75 foot.

Average Flow in Second-Feet

Daily:	Max.	6,710	June 29, 1936	Min.	.7	1934, 1945 & 1946	8
Monthly:	Max.	647	Oct. 1932	Min.	1.0	Sept. 1945	
Yearly:	Max.	83.2	1935	Min.	11.0	1943	

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	16.6	35.7	82.6	22.6	19.1	27.2	13.4	9.2	58.3	50.1	55.4	47.7
2	9.2	35.7	70.3	21.2	27.5	23.7	13.4	6.7	59.0	50.1	50.1	47.7
3	15.8	36.0	66.7	21.9	23.3	24.4	12.7	5.7	55.4	54.0	49.8	43.8
4	15.2	36.0	67.5	23.3	23.0	25.1	11.3	5.7	51.2	65.7	49.1	43.8
5	14.8	33.9	63.6	23.0	18.7	20.8	10.6	5.7	47.0	77.0	48.4	43.8
6	12.0	33.9	64.3	23.7	18.4	21.5	11.7	51.6	47.7	77.0	48.0	47.7
7	11.7	33.9	65.0	22.6	38.1	94.6	10.6	*2,470	48.7	77.0	47.3	51.9
8	12.0	31.8	61.1	23.0	37.8	203	11.0	*3,750	44.1	72.7	46.6	47.7
9	12.4	31.8	61.1	23.7	37.4	260	13.8	*1,680	42.7	72.4	47.3	55.8
10	12.7	31.8	56.5	24.4	37.1	149	17.7	268	43.4	68.5	43.8	59.7
11	14.1	31.8	53.7	24.7	36.4	58.3	12.4	177	44.1	68.5	44.5	59.7
12	14.1	34.3	50.9	24.0	33.2	39.6	12.7	145	42.0	66.0	44.8	51.9
13	15.2	34.3	48.0	22.6	32.8	34.6	10.9	134	42.7	63.2	45.6	51.9
14	15.2	34.3	39.2	24.7	32.1	30.7	10.2	129	40.6	64.3	46.3	59.7
15	16.6	34.3	30.4	23.5	31.8	30.0	9.5	123	38.5	69.6	46.6	59.7
16	16.6	34.3	30.0	23.7	31.1	27.9	8.8	114	107	57.9	46.3	59.7
17	18.0	31.8	50.0	24.0	29.0	27.2	8.1	109	84.8	50.5	43.4	59.7
18	18.0	31.8	29.7	24.4	16.2	25.1	7.4	116	53.7	55.8	45.6	51.9
19	19.1	31.8	29.7	19.4	16.6	26.1	7.8	112	74.9	50.1	45.2	51.9
20	19.4	24.4	29.3	20.8	17.3	24.0	9.5	112	58.3	48.7	44.8	56.9
21	24.4	18.4	29.0	19.1	14.5	23.7	9.2	111	51.6	47.7	44.5	54.4
22	31.8	29.0	18.7	15.2	22.2	9.5	110	48.0	50.5	48.0	43.8	
23	31.8	946	26.1	20.1	15.5	20.5	10.2	106	44.8	160	48.0	42.0
24	32.1	233	26.5	20.1	91.1	18.7	10.9	97.1	45.6	93.9	48.4	45.6
25	32.1	230	25.1	21.9	54.0	19.1	11.7	97.5	45.9	61.1	48.4	46.6
26	32.1	302	25.1	21.5	38.8	27.5	12.4	90.1	46.6	55.1	48.4	47.3
27	31.8	209	25.1	21.2	65.7	22.6	13.4	78.0	47.0	53.0	48.4	48.4
28	31.8	130	25.4	64.6	49.8	21.2	14.5	74.4	47.7	54.4	48.7	47.0
29	31.8		25.4	43.1	38.1	19.1	12.7	74.5	48.4	55.4	48.7	49.8
30	31.4		23.3	32.8	32.1	15.5	12.0	70.3	44.5	56.9	48.7	58.6
31	31.4		23.0		29.0	10.2		66.7	54.0			
Sum		2,761.0		744.1		1,382.9		* 10,499.2		2,001.1		1,588.7
	639.2	1,312.6		994.7		350.2			1,554.2		1,419.1	

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period October 1932-1949			Acre-Feet			
	Extreme Gage Feet		Day	Extreme Second-Feet				Normal	Acre-Feet					
	High	Low		High	Low				Maximum	Minimum				
Jan.	1.74	.98	3	45.6	2	6.0	20.6	1,270	2,464	15,990	375			
Feb.	7.05	1.28	23	1,640	21	18.4	98.6	5,480	1,709	9,990	1108			
Mar.	2.36	1.51	1	109	14	21.2	42.3	2,600	1,430	6,910	206			
Apr.	3.02	1.38	28	332	19	17.3	24.8	1,480	1,818	7,510	195			
May	3.22	1.51	27	218	1	13.4	32.1	1,970	3,700	23,850	494			
June	4.30	1.54	9	544	30	14.5	46.1	2,740	3,148	19,730	270			
July	1.97	1.44	9	32.8	19	6.0	11.3	695	2,205	9,740	106			
Aug.	12.37	1.41	7	* 6,890	#	5.7	* 339	* 20,830	* 2,670	20,830	77.8			
Sept.	3.35	1.90	16	265	16	36.4	51.8	3,080	2,688	16,000	57.5			
Oct.	4.00	1.97	23	385	16	45.6	64.6	3,970	3,906	39,790	117			
Nov.	2.03	1.90	1	554	17	41.0	47.3	2,810	2,434	25,590	101			
Dec.	2.10	1.94	#	59.7	2	41.3	51.2	3,150	2,513	20,720	260			
Yearly	12.37	.98		* 6,890		5.7	* 69.2	* 50,075	30,685	60,241	7,969			
											19,746			

* Partly estimated # Various days of the month @ October 1932-1949 8 Various days of the year

RIO GRANDE AT LAREDO, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car. The recorder is located on the downstream side of the first pier from the Mexican end of the railroad bridge between Laredo, Texas, and Nuevo Laredo, Tamaulipas, 884.3 river miles below the American Dam at El Paso, Texas. The cable is located 1.4 miles upstream from the railroad bridge. Zero of the gages at the recorder and at the cable are 351.51 feet and 352.89 feet respectively above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 176 meter measurements during the year, 174 by the Mexican and 2 by the United States Section of this Commission, and a continuous record of gage heights. Computations by shifting channel methods. Records available: May 1900 through December 1913; May, June, and October 1914; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June, November, and December 1922; January 1923 through December 1949. Gage-height records are available for January, February, and March 1914.

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

EXTREME FLOWS: The greatest recorded flow at this station was on September 3, 1932, when the gage height was 52.20 feet, and the discharge 335,000 second-feet. Minimum flow occurred on June 23, 1948 with a flow of 533 second-feet and a gage height of 3.38 feet.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,740	2,010	7,170	2,280	6,500	2,490	2,790	7,100	3,220	4,410	3,960	2,680
2	1,740	1,990	5,900	2,610	6,890	2,370	2,270	5,690	3,140	4,340	3,780	5,370
3	1,750	2,050	5,150	2,240	6,070	2,190	1,940	5,230	3,600	4,380	3,570	3,120
4	1,750	2,070	4,560	2,220	4,730	2,020	2,680	4,800	3,330	4,200	3,570	2,680
5	1,750	2,100	4,310	2,310	4,200	1,920	2,850	4,130	3,060	4,170	3,710	2,700
6	1,700	2,140	4,130	2,280	11,870	1,880	2,300	5,540	2,760	4,170	3,670	2,790
7	1,650	2,180	4,030	2,290	13,030	1,770	2,130	9,430	2,540	4,200	3,530	2,820
8	1,640	2,410	3,850	2,300	8,440	4,130	2,010	16,330	2,520	4,480	3,470	2,790
9	1,630	2,590	3,710	2,160	6,570	32,100	1,890	17,250	2,430	6,710	3,470	2,770
10	1,620	2,410	3,510	2,090	5,260	21,650	4,130	41,320	2,420	4,560	3,480	2,700
11	1,840	2,230	3,530	2,080	4,980	8,970	2,140	22,640	2,340	3,960	3,390	3,000
12	2,120	2,160	3,530	2,030	4,380	7,100	1,760	13,140	2,210	5,050	3,300	3,080
13	2,000	2,160	3,460	1,940	3,810	5,190	1,580	11,020	2,250	5,510	3,210	2,870
14	1,960	2,320	3,450	1,920	3,520	4,200	1,490	10,980	2,240	3,710	3,210	2,810
15	1,910	2,420	3,270	1,850	3,520	12,570	1,830	9,570	2,930	3,480	3,240	2,780
16	1,920	2,390	3,230	1,760	3,530	7,590	2,150	9,570	9,360	3,160	3,270	2,740
17	1,930	2,290	3,170	1,770	3,110	4,840	2,180	8,860	14,120	3,040	3,350	2,650
18	1,940	2,250	3,110	1,730	3,050	3,880	1,910	7,350	13,210	3,010	3,330	2,620
19	1,900	2,250	3,190	1,680	3,050	3,570	2,240	6,000	15,040	2,910	3,160	2,530
20	1,970	2,300	3,320	9,890	3,670	3,350	1,980	5,370	12,080	2,950	3,270	2,600
21	1,990	2,290	3,470	11,160	4,030	2,940	1,630	5,010	10,060	2,900	3,190	2,670
22	1,980	2,340	3,440	4,380	3,110	2,690	1,600	4,560	8,160	2,980	3,150	2,560
23	1,910	10,060	3,490	5,580	2,890	2,390	1,470	4,410	7,310	5,400	2,950	2,460
24	1,900	30,790	3,370	7,030	2,910	2,260	1,480	4,770	6,430	6,000	2,870	2,450
25	1,980	25,530	3,190	21,930	2,930	3,130	1,530	5,050	5,900	4,910	2,790	2,440
26	1,980	39,200	2,980	17,230	2,710	2,430	1,470	4,410	5,050	10,770	2,860	2,430
27	2,120	47,670	2,970	14,850	2,480	2,570	1,650	3,960	5,080	16,070	2,850	2,530
28	2,140	11,020	2,720	9,640	2,440	5,860	28,320	3,640	5,510	9,460	2,780	2,400
29	2,140	2,630	9,530	2,870	7,240	13,000	3,640	4,980	6,820	2,770	2,440	2,390
30	1,940	2,490	8,720	2,610	3,810	10,350	3,460	4,520	5,440	2,770	2,440	2,540
31	1,980	2,320			2,390	7,980	3,210			4,700		
Sum	213,620	159,460		169,100		269,420			157,850		85,410	
	58,520	112,650		141,550		114,730			167,800		97,920	

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1924-1949			Acre-Feet Normal 1938-1949			
	Extreme Gage Feet			High	Low			Normal	Maximum	Minimum				
	High	Low	Day											
Jan.	5.02	4.63	11	2,180	10	1,620	1,890	116,100	178,169	351,700	102,000			
Feb.	20.41	4.86	27	67,450	1	1,940	7,630	423,700	159,901	423,700	99,400			
Mar.	7.35	5.22	1	8,620	31	2,320	3,650	223,400	148,340	223,400	95,700			
Apr.	10.70	4.89	25	24,120	19	1,680	5,320	516,300	147,955	316,300	59,550			
May	9.19	5.15	6	16,350	31	2,320	4,570	280,800	267,446	856,000	68,300			
June	16.50	4.89	9	19,090	7	1,720	5,640	335,400	309,775	1,357,000	249,303			
July	14.70	4.69	28	12,380	423	1,470	3,700	227,600	287,170	1,250,000	46,850			
Aug.	16.93	5.64	10	50,500	31	3,210	8,690	534,400	295,357	883,000	83,570			
Sept.	10.01	5.22	17	20,590	12	2,210	5,590	332,800	590,274	2,943,000	93,740			
Oct.	9.84	5.15	27	20,450	21	2,850	5,090	513,100	170,603	1,951,000	125,400			
Nov.	5.94	5.41	1	4,240	29	2,700	3,260	194,200	213,829	570,800	114,100			
Dec.	7.51	5.28	2	9,250	30	2,320	2,760	169,400	182,504	352,700	106,700			
Yearly	20.41	4.63		67,450		1,470	4,790	3,467,200	3,251,323	7,017,110	1,862,800			
											3,165,784			

\$ And other days

RIO SALADO AT CD. GUERRERO, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and two reinforced concrete Cipoletti weirs, with a combined capacity of 636 second-feet, located at a place called "El Cable" about 6.2 miles above the confluence of the Rio Salado with the Rio Grande and 2 miles southwest of Ciudad Guerrero, Tamaulipas. This stream enters the Rio Grande 946.1 river miles below the American Dam at El Paso, Texas. Zero of the gage is 265.75 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 89 meter measurements during the year, the weir discharge curve, and a continuous record of gage heights. Computations by shifting channel methods for flows greater than 636 second-feet. Records available: 1900-1913 and 1923-1949.

REMARKS: The flow at this station is greatly modified by irrigation diversions and reservoirs.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: 43,800 second-feet on September 7, 1933 with a gage height of 18.86 feet. Min. sometimes dry.

Average Flow in Second-Feet

Daily:	Max. 35,070	Sept. 7, 1933	Min.	sometimes dry
Monthly:	Max. 10,950	Oct. 1932	Min.	dry January and February 1940
Yearly:	Max. 1,850	1932	Min.	141 1929

Mean Daily Discharge in Second Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	33.2	28.6	169	113	136	66.0	28.6	156	60.0	57.2	72.4	20.5
2	31.1	31.1	169	79.8	103	51.6	31.1	103	235	43.4	170	24.4
3	31.1	33.2	119	45.9	97.8	43.4	91.5	84.0	103	38.1	113	119
4	31.1	35.7	88.3	33.2	113	35.7	788	79.8	103	35.7	79.8	51.4
5	31.1	35.7	69.2	28.6	130	31.1	530	66.0	197	35.7	63.2	43.4
6	28.6	35.7	60.0	26.5	88.3	28.6	494	130	169	35.7	48.7	75.6
7	28.6	35.7	48.7	26.5	72.4	26.5	286	183	119	38.1	43.4	51.4
8	28.6	35.7	40.6	26.5	252	24.4	212	130	84.0	38.1	38.1	38.1
9	28.6	35.7	38.1	28.6	227	313	228	124	60.0	35.7	35.7	31.1
10	31.1	35.7	38.1	26.5	136	299	212	381	51.6	33.2	33.2	26.5
11	31.1	33.2	38.1	24.4	4,380	1,243	156	420	45.9	33.2	31.1	24.3
12	28.6	31.1	40.6	24.4	5,540	410	108	277	40.6	31.1	22.2	22.2
13	31.1	28.6	40.6	26.5	5,085	220	97.8	162	38.1	28.6	26.5	22.2
14	33.2	26.5	38.1	28.6	3,960	156	97.8	113	35.7	1,290	24.4	22.2
15	33.2	26.5	40.6	28.6	897	113	97.8	84.0	33.2	823	22.2	26.5
16	40.6	24.4	38.1	28.6	551	84.0	456	69.2	33.2	410	22.2	26.5
17	43.4	22.2	35.7	28.6	410	519	788	60.0	33.2	197	22.2	24.4
18	40.6	20.5	33.2	28.6	313	473	295	57.2	33.2	119	20.5	28.6
19	40.6	20.5	33.2	31.1	252	220	350	51.6	765	88.3	20.5	28.6
20	38.1	20.5	33.2	31.1	204	124	252	48.7	1,570	69.2	20.5	28.6
21	35.7	18.4	35.7	31.1	169	84.0	149	48.7	1,190	57.2	20.5	28.6
22	35.7	16.6	33.2	858	149	63.2	108	43.4	1,040	48.7	20.5	26.5
23	35.7	16.6	31.1	22,670	136	51.6	84.0	40.6	350	43.4	20.5	26.5
24	35.7	18.4	31.1	7,380	124	43.4	72.4	38.1	227	40.6	20.5	24.4
25	35.7	22.2	35.7	3,310	108	66.0	66.0	35.7	183	33.2	18.4	24.4
26	35.7	213	35.7	4,170	97.8	79.8	63.2	35.7	108	31.1	16.6	26.5
27	33.2	97.8	35.7	1,487	92.9	60.0	35.7	75.6	31.1	28.6	16.6	28.6
28	31.1	197	33.2	572	84.0	45.9	57.2	40.6	66.0	66.0	16.6	28.6
29	31.1	295	31.1	295	75.6	48.7	54.4	43.4	190	84.0	18.4	31.1
30	31.1	33.2	183	69.2	35.7	72.4	38.1	79.8	75.6	18.4	31.1	31.1
31	31.1	33.2	72.4			204	35.7	79.8				
Sum	1,196.8	41,671.7		5,037.7		3,215.2		4,068.5		1,048.9		
	1,035.4	1,580.3		24,125.4		6,590.2		7,317.1		1,125.7		

Current Year 1949

Period 1924-1949

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet			Normal 1928-1949
	High	Low	Day	High	Low		Acres-Foot	Normal	Maximum	
Jan.	2.10	1.90	#	43.4	#	28.6	33.4	2,050	14,459	144,110
Feb.	4.33	1.71	26	540	#	16.6	42.7	2,370	10,173	98,520
Mar.	3.15	1.94	1	197	#	31.1	51.0	3,130	10,557	95,740
Apr.	17.29	1.84	23	26,240	#	24.4	1,390	82,660	14,548	82,660
May	9.71	2.40	11	7,030	#	69.2	778	47,850	42,581	* 253,000
June	6.14	1.84	11	1,860	#	24.4	168	9,990	36,835	192,000
July	5.71	1.87	4	1,410	#	26.5	213	13,070	19,491	100,000
Aug.	5.18	2.00	10	893	#	35.7	104	6,380	31,803	260,180
Sept.	6.86	1.97	19	2,660	#	33.2	244	14,510	90,841	600,000
Oct.	6.43	1.90	14	2,170	#	28.6	131	8,070	66,330	673,070
Nov.	5.12	1.71	2	190	#	16.6	37.5	2,230	22,651	248,590
Dec.	5.08	1.77	3	183	#	20.5	33.8	2,080	16,041	198,160
Yearly	17.29	1.71		26,240		16.6	269	194,390	376,310	1,350,300
									101,800	246,120

Various days of the month * Partly estimated

RIO GRANDE NEAR ZAPATA, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch, located about 3 miles below the town of Zapata, Texas, 7.5 miles northeast of Guerrero, Tamaulipas 1.4 river miles below the confluence of the Río Salado with the Rio Grande, and 947.5 river miles below the American Dam at El Paso, Texas. Zero of the gage is at mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 63 meter measurements during the year, 52 by the United States Section and 11 by the Mexican Section of this Commission and continuous record of gage heights. Computations by shifting channel methods. Records available: January 1932 to December 31, 1949.

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

EXTREME FLOWS: The greatest recorded flow was on September 4, 1932, when the gage height was 262.07 feet and the flow was 261,000 second-feet. The lowest flow recorded was on June 23, 1948, when the gage height was 219.12 feet and the flow was 491 second-feet.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,900	2,130	10,200	2,540	7,540	2,440	3,640	7,910	3,090	4,840	4,570	2,920
2	1,870	2,130	7,180	2,420	6,930	2,550	2,780	7,100	3,360	4,590	4,190	3,720
3	1,860	2,170	5,680	2,720	7,060	2,430	2,480	5,850	* 3,350	4,350	4,040	7,620
4	1,860	2,310	* 5,160	2,420	5,730	2,170	4,970	6,750	* 3,600	4,250	3,650	3,650
5	1,830	2,270	* 4,880	2,340	4,770	2,020	4,170	7,110	3,400	4,200	3,750	2,870
6	1,790	2,220	* 4,650	2,400	5,100	1,950	3,590	4,570	3,170	4,150	3,800	2,800
7	1,780	2,240	* 4,350	2,330	15,000	1,960	2,870	* 5,970	3,800	4,090	3,770	2,850
8	1,760	2,390	* 4,140	2,210	11,700	1,870	2,500	* 9,840	2,860	4,040	3,740	2,810
9	1,750	* 2,470	3,990	2,120	7,680	14,100	2,780	* 18,800	2,420	5,060	3,680	2,870
10	1,740	* 2,260	3,780	2,090	6,170	35,400	2,470	* 20,000	2,410	5,760	3,650	2,760
11	1,720	* 2,190	3,590	2,020	9,540	15,900	3,930	* 41,300	2,370	4,190	3,620	2,770
12	1,910	* 2,090	3,580	2,020	12,300	9,090	2,210	* 17,000	2,460	4,100	3,560	3,250
13	2,250	* 2,040	3,520	2,050	9,810	6,790	1,760	* 12,400	2,380	5,320	3,450	3,150
14	2,210	* 2,140	3,410	2,010	8,610	4,960	1,580	* 11,700	2,420	5,740	3,370	3,020
15	2,160	* 2,190	3,370	1,970	4,550	8,920	1,520	* 11,200	2,400	4,720	3,360	3,010
16	2,150	2,320	3,260	1,870	4,250	10,700	2,320	* 10,100	3,570	3,850	3,360	2,860
17	2,140	2,340	3,230	1,820	4,020	6,380	3,400	* 9,990	11,600	3,570	3,380	2,770
18	2,140	2,310	3,150	1,850	3,670	5,030	2,730	* 9,400	16,900	3,360	3,430	2,750
19	2,140	2,330	3,020	1,820	3,580	4,020	2,350	* 8,000	14,600	3,230	3,400	2,690
20	2,110	2,350	3,110	2,020	3,490	3,720	2,560	* 6,500	18,400	3,150	3,260	2,660
21	2,080	2,390	3,270	13,800	4,160	3,390	2,220	* 5,890	13,300	3,070	3,280	2,700
22	2,090	2,450	3,320	8,410	4,020	3,060	1,720	* 5,300	11,500	3,160	3,200	2,660
23	2,070	2,720	3,250	47,000	3,390	2,790	1,640	* 4,900	7,630	3,460	3,250	2,600
24	2,060	17,000	3,260	51,400	5,130	2,520	1,520	* 4,630	6,370	5,330	3,080	2,560
25	2,060	32,700	3,120	65,400	5,170	5,040	1,480	* 4,900	5,780	5,990	2,880	2,520
26	2,140	23,900	2,950	60,700	3,170	4,020	1,510	* 5,150	5,610	5,040	2,820	2,560
27	2,160	51,600	2,860	27,500	2,970	2,710	1,470	* 4,310	5,260	15,700	2,880	2,630
28	2,240	23,700	2,920	15,000	2,760	2,850	6,960	* 4,160	5,060	13,600	2,950	2,590
29	2,260	2,720	9,310	2,640	7,820	26,300	* 3,980	5,250	9,280	2,870	2,520	2,520
30	2,220	2,650	12,200	2,990	5,540	11,500	3,700	5,120	6,630	2,910	2,550	2,610
31	2,090	2,480		2,690		10,100	3,400		5,240			
Sum	201,350		333,560		182,140		*281,790		163,060		92,260	
	62,540		120,050		176,590		123,030		179,540		103,320	

Current Year 1949

Period 1932-1949

Acre-Feet

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1949
	High	Low	Day	High	Low			Normal	Maximum	Minimum	
Jan.	220.70	220.34	13	2,280	11	1,720	2,020	124,000	189,598	* 484,450	106,000
Feb.	233.89	*220.58	27	60,300	13	* 2,000	7,190	399,000	172,899	399,000	106,000
Mar.	223.43	220.78	1	12,300	31	2,430	3,870	238,000	167,949	292,000	106,000
Apr.	240.76	220.34	25	94,100	20	1,730	11,100	662,000	177,054	662,000	65,200
May	224.88	220.75	7	15,900	31	2,430	5,700	350,000	305,591	682,000	81,800
June	229.50	220.41	10	40,800	8	1,820	6,070	361,000	366,470	1,517,000	59,000
July	228.81	220.14	29	37,100	27	1,430	3,970	244,000	349,167	1,238,000	92,300
Aug.	*230.70	220.04	11	* 18,000	31	3,270	* 9,090	* 559,000	327,298	* 721,000	108,000
Sept.	225.85	220.69	20	22,000	13	2,310	5,980	356,000	762,699	2,895,330	76,400
Oct.	225.13	220.96	27	19,200	22	2,970	5,260	323,000	590,430	2,396,440	135,000
Nov.	221.64	220.90	1	4,940	26	2,740	3,440	205,000	237,530	748,020	123,000
Dec.	222.95	220.78	3	10,000	29	2,470	2,980	183,000	199,620	591,380	116,000
Yearly	240.76	220.14		94,100		1,430	5,530	4,004,000	3,846,305	8,038,070	2,231,000
											3561,975

* Partly estimated

SPECIAL STATIONS BELOW ZAPATA IN 1948

During June 1948 seven special gaging stations on the Rio Grande and tributary drains below Zapata were operated in conjunction with an investigation of dry weather losses and gains in this reach of the river channel. The name and a brief description of each of these stations follows:

CHAPEÑO STATION on the Rio Grande near the village of Chapeño, 27.2 river miles below Zapata gaging station and 974.7 river miles below American Dam at El Paso, Texas.

RANCHERIAS DRAIN enters the Rio Grande from the Mexican side 57.2 river miles below Zapata gaging station and 1,004.7 river miles below the American Dam at El Paso, Texas.

LOS FRENSOS DRAIN from Mexico enters the Río San Juan channel a short distance above its confluence with the Rio Grande, such confluence being 59.9 river miles below Zapata gaging station and 1,007.4 river miles below the American Dam at El Paso, Texas.

RIO SAN JUAN channel .4 mile above Camargo Ferry in Mexico, several miles above the confluence with the Rio Grande and above the Los Fresnos Drain. The Río San Juan enters the Rio Grande 59.9 river miles below Zapata gaging station and 1,007.4 river miles below American Dam at El Paso, Texas.

PUERTECITOS DRAIN enters the Rio Grande from Mexico 7.3 river miles below Rio Grande City Station and 1,022.6 river miles below the American Dam at El Paso, Texas.

ESTERITO DRAIN enters the Rio Grande from Mexico 51.5 river miles below Rio Grande City Station and 1,066.8 river miles below the American Dam at El Paso, Texas.

ANZALDUSAS STATION on the Rio Grande near Mission, Texas, 59.5 river miles below Rio Grande City Station and 1,074.8 river miles below the American Dam at El Paso, Texas.

Frequent current meter measurements by wading were made at all of the above stations. Records of gage height were collected by continuous recorders at all of the above stations except as follows: At Rancherías and Los Fresnos drains gage readings were observed and recorded every hour. At Río San Juan the flow was very uniform and was interpolated between frequent meter measurements.

In addition to the drains named above there were five others in this same reach, none of which flowed any water during the days listed below.

The first four stations named hereunder all lie between Zapata Station and Rio Grande City Station on the Rio Grande. In this reach the stations were operated between June 3 to 11. The last three stations named hereunder all lie between Rio Grande City Station and Anzaldúas Dam site. In this reach the stations were operated between June 14 and 22, except Esterito Drain which was also operated during the earlier period.

Mean Daily Discharge in Second Feet — June 1948

Day	Chapeño Station	Drains Tributary to the Rio Grande					Anzaldúas Station
		Rancherías	Los Fresnos	Río San Juan	Puertecitos	Esterito	
1							
2							
3							
4	1,520	21.2	4.6	* 23.7			* 16.2
5	1,560	7.4	1.4	21.2			* 29.0 10.6
6	1,640	9.2	* .7	20.8			7.1
7	1,380	8.5	* .4	21.2			4.6
8	1,430	8.1	2.8	20.8			4.6
9	1,800	13.4	7.8	18.4			48.4
10	1,690	16.6	4.2	22.2			52.6
11	* 1,490			* 23.3			69.6
12							
13							
14					* 17.3	618	
15					23.7	551	
16					88.6	321	
17					144	305	892
18					315	223	1,080
19					378	98.9	1,070
20					305	234	1,160
21						332	918
22							954
23							
24							
25							

* Partly estimated

RIO ALAMO AT CD. MIER, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and reinforced concrete weir for measurement of flows up to 177 second-feet, located about 3.1 miles above the confluence of the Río Alamo with the Rio Grande and .6 mile west of Ciudad Mier, Tamaulipas, at a point called "El Paso del Cántaro". This stream enters the Rio Grande 984.6 river miles below the American Dam at El Paso, Texas. Zero of the gage is 187.04 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 43 meter measurements during the year, the weir discharge tables at low flows, and a continuous record of gage heights. High flow computations by shifting channel methods. 32 meter measurements were made to define low flow records during the period of construction of a bridge between the gage well and weir from March 18 to April 22, 1949. Records available: July 1, 1923 to December 31, 1949.

REMARKS: The flow of this spring-fed stream is modified by small storage and irrigation diversions above this station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 144,800 second-feet on September 11, 1948 with a gage height of 33.56 feet. Min. dry at times during all years of record except 1934 and 1935.

Average Flow in Second-Feet

Daily:	Max.	87,230	Sept. 11, 1948	Min.	frequently dry
Monthly:	Max.	5,170	Sept. 1948	Min.	frequently dry
Yearly:	Max.	505	1944	Min.	16.4 1929

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.7	10.6	33.9	12.7	54.7	21.5	4.2	10.6	452	13.1	21.6	18.7
2	18.7	10.6	27.9	13.8	54.7	18.7	2.5	13.1	3,550	8.1	13.1	18.7
3	21.5	10.6	27.9	13.4	53.2	10.6	2.5	10.6	319	8.1	10.6	21.5
4	21.5	10.6	24.7	20.8	47.3	10.6	18.7	6.0	54.7	6.0	8.2	21.5
5	18.7	10.6	21.5	24.0	43.8	10.6	37.1	4.2	18.7	4.2	8.1	21.5
6	18.7	13.1	21.5	24.4	43.8	10.6	15.9	8.1	8.1	4.2	8.1	21.5
7	15.9	13.1	21.5	26.5	40.6	8.1	8.1	54.7	6.0	4.2	8.1	21.5
8	15.9	13.1	18.7	29.7	43.8	8.1	6.0	37.1	6.0	4.2	8.1	21.5
9	15.9	13.1	18.7	26.1	40.6	171	4.2	15.9	2.5	2.5	8.1	21.5
10	15.9	13.1	18.7	19.4	58.6	579	27.9	8.1	30.7	2.5	8.1	21.5
11	15.9	13.1	18.7	19.4	3,210	120	84.8	6.0	40.6	2.5	8.1	18.7
12	15.9	13.1	18.7	18.4	5,120	27.9	18.7	4.2	15.9	2.5	8.1	15.9
13	10.6	13.1	21.5	16.2	1,210	18.7	13.1	4.2	10.6	1.1	6.0	15.9
14	10.6	10.6	18.7	16.2	196	15.9	8.1	2.5	8.1	1.1	6.0	15.9
15	8.1	10.6	21.5	16.6	131	27.9	150	2.5	6.0	1.1	6.0	15.9
16	8.1	10.6	24.7	22.2	99.6	109	710	2.5	6.0	1.1	6.0	15.9
17	8.1	10.6	21.5	19.4	84.8	24.7	179	2.5	6.0	1.1	8.1	15.9
18	8.1	10.6	21.5	20.8	75.9	13.1	37.1	2.5	6.0	1.1	8.1	15.9
19	8.1	13.1	23.0	24.0	67.1	10.6	18.7	1.1	236	0	8.1	15.9
20	8.1	13.1	24.0	23.7	59.0	10.6	10.6	1.1	918	0	8.1	15.9
21	10.6	13.1	24.0	18.0	54.7	8.1	6.0	0	286	0	8.1	15.9
22	10.6	13.1	23.7	*1,700	51.2	8.1	4.2	152	54.7	10.6	15.9	15.9
23	10.6	13.1	19.4	*4,100	47.3	6.0	2.5	0	24.7	18.7	15.9	13.1
24	10.6	13.1	17.7	3,500	43.8	6.0	2.5	0	13.1	4.2	15.9	15.9
25	10.6	13.1	20.8	5,260	40.6	6.0	2.5	0	8.1	2.5	15.9	13.1
26	10.6	97.8	20.1	1,630	63.2	6.0	2.5	0	8.1	1.1	18.7	13.1
27	10.6	530	19.1	305	40.6	6.0	1.1	0	222	1.1	18.7	13.1
28	10.6	61.4	14.5	89.7	30.7	6.0	1.1	51.2	202	1.1	18.7	13.1
29	10.6	13.1	67.1	27.9	6.0	1.1	15.9	47.3	784	18.7	13.1	13.1
30	10.6	18.4	59.0	24.7	4.2	1.1	8.1	21.5	292	18.7	15.9	15.9
31	10.6	13.8	24.7	24.7	1.1	4.2	54.7	0	54.7	18.7	15.9	15.9
Sum			1,871.9	17,136.5	1,289.6		276.9	1,282.8		529.3		
			399.6	653.4	11,181.9		1,382.9	6,665.7		334.6		

Month	Current Year 1949						Period 1924-1949			Acre-Feet Normal 1958-1949	
	Extreme Gage Feet			Extreme Second-Feet			Average Second-Feet	Total	Acre-Feet		
	High	Low	Day	High	Day	Low			Normal		
Jan.	1.64	1.48	#	21.5	#	8.1	12.9	793	4,808	34,920	
Feb.	5.77	1.51	26	2,320	#	10.6	66.9	3,710	3,403	25,550	
Mar.	1.61	1		40.6	29	13.1	21.1	1,300	3,446	19,830	
Apr.	14.76	25	14,160	#	12.7	571	33,990	6,931	33,990	86.0	
May	11.81	1.67	12	8,900	#	24.7	361	22,180	16,120	* 137,000	
June	4.49	1.41	10	1,120	#	4.2	43.0	2,560	14,313	83,240	
July	4.40	16	1,140	30	0	44.6	2,740	8,061	37,590	229	
Aug.	2.62	28	153	#	0	8.9	549	16,759	194,200	0	
Sept.	10.30	1.35	2	7,950	#	1.1	222	13,220	39,814	307,900	
Oct.	7.18	29	3,780	#	0	41.4	2,540	15,078	51,620	0	
Nov.	1.74	1.44	1	30.7	#	6.0	11.2	664	4,005	21,940	
Dec.	1.67	1.54	3	24.7	#	13.1	17.1	1,050	4,013	15,000	
Yearly	14.76			14,160		0	118	85,296	136,749	366,826	
										11,908.7	
										137,219	

Various days of the month * Partly estimated

RIO GRANDE AT ROMA, TEXAS

DESCRIPTION: Water-stage recorder at international bridge between Roma, Texas, and San Pedro, Tamaulipas, 992.0 river miles below the American Dam at El Paso, Texas, and 14.9 river miles above the confluence of the Río San Juan from Mexico. Zero of the gage is 145.93 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 194 meter measurements during the year from bridge, 185 by the Mexican Section and 9 by the United States Section of this Commission, and a continuous record of gage heights. Computations by shifting channel methods. Records available: May 1900 and September 1900 through December 1913; October 1914; September and October 1917; September and October 1919; August and September 1920; June 1922 and November 1922 through December 1949. Gage-height records are available for January, February, and March 1914.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. Backwater from the Río San Juan sometimes reaches this station.

EXTREME FLOWS: The greatest recorded flow was on September 5, 1932, when the gage height was 35.4 feet and the flow 203,000 second-feet. The lowest flow recorded was on June 23, 1948 when the flow was 526 second-feet at a stage of -1.21 feet.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,820	2,110	12,110	2,490	10,030	2,400	4,180	8,480	3,440	4,590	5,050	2,880
2	1,790	2,210	8,260	2,690	7,100	2,200	3,180	7,350	8,190	4,550	4,520	2,850
3	1,790	2,220	6,530	2,550	7,450	2,300	2,550	6,360	4,870	4,380	4,270	6,360
4	1,760	2,260	5,720	2,610	6,750	2,210	4,060	6,500	3,990	4,580	4,060	5,610
5	1,720	2,270	5,230	5,540	1,970	4,060	7,330	3,990	4,410	3,920	3,420	
6	1,730	2,180	4,770	2,230	4,770	1,840	4,130	5,540	3,600	4,380	3,920	3,010
7	1,730	2,150	4,520	2,320	10,910	1,840	3,150	5,160	4,130	4,380	3,920	3,090
8	1,680	2,170	4,270	2,300	13,140	1,880	2,590	9,750	3,330	4,380	3,810	3,010
9	1,660	2,330	4,030	2,150	8,720	5,510	2,300	19,000	2,710	4,410	3,610	2,940
10	1,700	2,500	3,920	2,050	7,050	34,170	3,640	19,070	2,600	6,710	3,640	2,890
11	1,690	2,510	3,710	1,960	11,690	20,580	3,120	40,610	2,530	5,440	3,670	2,840
12	1,710	2,400	3,600	1,940	18,820	10,100	3,270	20,340	2,590	4,240	3,570	2,890
13	2,020	2,280	3,670	1,960	11,730	7,450	2,020	12,610	2,440	4,130	3,460	3,380
14	2,220	2,130	3,570	1,940	9,960	5,850	1,740	11,370	2,290	6,000	3,320	3,160
15	2,130	2,210	3,530	1,890	6,360	4,630	2,180	11,190	2,350	5,850	3,320	3,090
16	2,090	2,330	3,440	1,850	4,590	11,760	3,470	10,030	2,610	4,380	3,330	3,020
17	2,080	2,460	3,270	1,820	4,380	7,880	3,880	10,140	8,300	3,850	3,440	2,870
18	2,020	2,330	3,230	1,780	3,960	5,790	3,140	9,220	16,320	3,600	3,490	2,820
19	1,960	2,270	3,040	1,770	3,710	4,480	2,700	7,800	13,990	3,490	3,520	2,720
20	2,060	2,290	3,040	1,660	3,530	3,810	2,150	6,390	22,140	3,300	3,400	2,770
21	2,030	2,310	3,110	7,350	3,490	3,600	2,480	5,650	16,250	3,160	3,280	2,770
22	2,050	2,340	3,240	11,900	4,660	3,230	1,960	5,400	12,540	3,780	3,340	2,730
23	2,070	2,300	3,230	67,800	3,740	2,900	1,640	4,980	8,510	4,410	3,360	2,610
24	2,060	*6,430	3,270	68,160	3,350	2,630	1,560	4,700	7,030	4,690	3,300	2,600
25	2,030	*31,710	3,220	66,390	3,190	2,590	1,450	4,770	6,390	5,720	3,060	2,630
26	2,110	28,290	3,120	81,930	3,170	6,500	1,380	5,230	6,290	5,610	3,010	2,670
27	2,140	44,500	2,970	44,140	3,010	3,140	1,390	4,770	5,760	9,820	3,000	2,670
28	2,140	39,200	2,970	19,280	2,800	2,550	1,390	4,450	5,720	15,220	3,040	2,720
29	2,160	2,890	11,440	2,630	4,200	23,480	4,060	5,300	15,750	2,950	2,690	
30	2,210	2,650	10,770	2,730	12,150	3,810	10,660	5,090	10,060	2,860	2,620	
31	2,150	2,530			2,860	3,780			6,210		2,730	
Sum	202,690	126,560		431,420	195,800	177,990	121,350	285,640	195,290	175,260	106,470	95,060

Current Year 1949

Period 1924-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Acre-Feet Normal 1958-1949
	High		Low	Day	Day			High	Low	Day	
	High	Low	Day	Day	High	Low	Normal	1958-1949			
Jan.	.46	.10	13	2,260	9	1,660	1,950	120,000	204,511	467,400	103,600
Feb.	16.90	.23	28	57,920	1	2,080	7,240	402,000	179,862	402,000	107,000
Mar.	7.41	.59	1	16,670	31	2,450	4,080	251,000	175,368	325,500	99,000
Apr.	22.67	.10	26	98,530	21	1,650	14,380	855,700	192,612	855,700	64,250
May	8.63	.62	12	22,180	30	2,520	6,320	388,400	318,596	706,300	109,320
June	13.12	.03	10	43,080	7	1,810	5,930	353,000	386,520	1,586,000	53,990
July	11.19	-.33	29	34,040	26	1,380	5,910	240,700	338,301	1,217,000	94,100
Aug.	13.68	1.35	11	14,850	31	3,600	9,210	566,600	351,738	904,000	109,400
Sept.	8.53	.36	20	24,850	14	2,250	6,510	387,400	732,829	3,048,000	69,900
Oct.	6.92	.85	28	17,730	22	3,120	5,650	347,600	573,006	3,372,000	137,700
Nov.	2.40	.79	1	5,330	30	2,810	3,550	211,200	245,441	736,000	126,800
Dec.	3.94	.56	3	8,690	25	2,590	3,070	188,600	208,027	565,100	114,000
Yearly	22.67	-.33		98,530		1,380	5,960	4,312,200	3,936,811	8,098,000	2,227,000

^a Estimated * Partly estimated

CONTRIBUTIONS FROM RIO SAN JUAN**Above Rio Grande City Station**

DESCRIPTION: The discharge reported below passed through Marte Gómez Reservoir and reached the Rio Grande at or above the confluence of the Río San Juan which is 7.9 river miles above the Rio Grande City gaging station, and 1,007.4 river miles below the American Dam at El Paso, Texas. The flow consisted of small seepage through the bank near the dam which was measured by weir, discharges over the spillway which were determined by the discharge rating curve of the spillway, and wastes from canals of the first unit. In addition to the flows reported below, there was an undetermined amount of waste water from drains which entered the Rio Grande from Mexico. Marte Gómez Reservoir is located on the Río San Juan 12.4 river miles above the confluence with the Rio Grande. The zero of the reservoir gage is 7.64 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on meter measurements and weir and spillway discharge curves. Records furnished by the Department of Agriculture and Livestock of Mexico. Records available: January 1946 to December 31, 1949.

REMARKS: In 1949, from April 27 to June 1, inclusive, 118,400 acre-feet of water passed over the spillway of the dam, with a maximum mean daily discharge of 6,640 second-feet and a gage height of 251.97 feet occurring May 13.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.4	15.9	7.1	7.4	996	150	9.2	8.1	8.1	8.8	4.6	4.6
2	7.4	15.9	7.1	7.4	996	8.8	9.2	8.1	8.1	8.8	4.6	4.6
3	7.4	15.9	7.1	7.4	996	8.8	9.2	8.1	8.1	8.8	4.6	4.6
4	7.4	15.9	7.1	7.4	855	8.8	9.2	8.1	8.1	8.9	4.6	4.6
5	7.4	15.9	7.1	7.4	733	8.8	9.2	8.1	8.1	8.8	4.6	4.6
6	7.4	15.9	7.1	7.4	290	8.8	9.2	8.1	8.1	8.8	4.6	4.6
7	7.4	15.9	7.1	7.4	290	8.8	9.2	8.1	8.1	8.8	4.6	4.6
8	7.4	15.9	7.1	7.4	855	8.9	9.2	8.1	8.1	8.9	4.6	4.6
9	7.8	15.9	7.4	7.4	713	8.8	9.5	8.1	8.5	8.8	4.9	4.6
10	7.8	15.9	7.4	7.4	431	8.8	9.5	8.1	8.5	8.8	4.6	4.6
11	7.8	15.9	7.4	7.4	1,560	8.8	9.5	8.1	8.5	8.8	4.9	4.6
12	7.8	15.9	7.4	7.4	6,070	8.8	9.5	8.1	8.5	8.9	5.0	4.6
13	7.8	15.9	7.4	7.4	6,640	8.8	9.5	8.1	8.5	8.8	4.9	4.6
14	7.7	15.9	7.4	7.4	5,540	8.8	9.5	8.1	8.5	8.8	5.0	4.6
15	7.8	15.9	7.4	7.4	4,590	8.9	9.5	8.1	8.5	8.8	4.9	4.6
16	7.8	15.9	7.4	7.4	3,350	8.8	9.5	8.1	8.5	8.9	5.0	4.6
17	7.8	15.9	7.4	7.4	2,900	8.8	9.5	8.1	8.5	8.8	4.9	4.6
18	7.8	15.9	7.4	7.4	2,480	8.8	9.5	8.1	8.5	8.8	4.9	4.6
19	7.8	15.9	7.4	7.4	2,060	8.8	9.5	8.1	8.5	8.8	5.0	4.6
20	7.7	15.9	7.5	7.4	1,770	8.8	9.5	8.1	8.5	8.9	4.9	4.6
21	7.8	15.5	7.4	7.4	1,700	8.8	9.5	8.1	8.5	8.8	4.9	4.6
22	7.8	15.5	7.4	7.4	1,630	8.9	9.5	8.1	8.5	8.8	5.0	4.6
23	7.8	15.5	7.4	7.4	1,560	8.5	9.5	8.1	8.5	8.9	4.9	4.6
24	7.8	15.5	7.4	7.1	1,420	8.5	9.5	7.8	8.5	8.5	4.9	4.2
25	7.8	15.5	7.4	7.1	1,280	8.5	9.5	7.8	8.5	8.5	5.0	4.2
26	7.7	15.5	7.4	7.1	996	8.5	9.5	7.8	8.5	8.5	4.9	4.2
27	7.8	15.5	7.4	290	1,420	8.5	9.5	7.9	8.5	8.5	5.0	4.2
28	7.8	15.5	7.4	855	996	8.5	9.5	7.8	8.5	8.5	4.9	4.2
29	7.8	15.5	7.4	855	855	8.5	9.5	7.8	8.5	8.5	4.9	4.2
30	7.8	15.5	7.4	996	572	8.5	9.5	7.8	8.5	8.5	4.9	4.2
31	7.7			7.5	290		9.6	7.9		8.5		
Sum	442.0		3,187.5		403.1		248.9		271.0		139.4	
	238.2		227.2		56,814		292.2		251.8		145.5	

Month	Current Year 1949						Period 1946-1949		
	Extreme Gage Feet ^a		Extreme Second-Feet		Average Second- Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	Day			High	Maximum	Minimum
Jan.	250.39	249.87	#	7.8	#	7.4	7.7	472	8,814
Feb.	249.87	248.75	#	15.9	#	15.5	15.8	877	5,702
Mar.	249.18	248.62	#	7.5	#	7.1	7.3	451	2,135
Apr.	250.69	247.80	30	996	#	7.1	106	6,320	2,446
May	251.97	250.52	13	6,640	#	290	1,830	112,700	28,621
June	250.49	248.16	1	150	#	8.5	13.4	800	688
July	248.10	246.62	31	9.6	#	9.2	9.4	580	627
Aug.	246.55	244.65	#	8.1	#	7.8	8.0	494	22,119
Sept.	244.62	243.34	#	8.5	#	8.1	8.4	499	56,970
Oct.	243.34	241.93	#	8.9	#	8.5	8.7	538	45,517
Nov.	242.65	242.49	#	5.0	#	4.6	4.8	289	18,244
Dec.	242.19	242.26	#	4.6	#	4.2	4.5	276	1,728
Yearly	251.97	242.26		6,640		4.2	172	124,296	196,611
									478,965
									67,831

* Water-surface elevations in Marte Gómez Reservoir # Mean daily # Various days of the month

RIO GRANDE NEAR RIO GRANDE CITY, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch, located about 4 river miles below Rio Grande City, Texas, 3.7 miles northeast of Camargo, Tamaulipas, 7.9 river miles below the confluence of the Río San Juan with the Rio Grande and 1,015.3 river miles below the American Dam at El Paso, Texas. Zero of the gage is at mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 117 meter measurements during the year, 105 by the United States Section and 12 by the Mexican Section of this Commission and a continuous record of gage heights. Computations by shifting channel methods. Records available: May, June, and October 1914; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June 1922; September 1923; January 1924 through December 1949.

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

EXTREME FLOWS: The greatest recorded flow was on September 5, 1932 when the peak stage was 157.4 feet and the flow was 198,800 second-feet.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,920	2,200	16,500	2,550	11,600	2,820	5,970	8,780	3,210	4,480	5,680	2,790
2	1,880	2,220	8,930	2,690	8,340	2,480	3,840	7,560	6,560	4,380	4,700	2,760
3	1,880	2,250	6,680	2,560	7,610	2,530	2,840	6,730	6,330	4,270	4,290	3,960
4	1,870	2,240	5,890	2,810	7,120	2,380	2,740	5,590	4,010	4,230	4,000	6,190
5	1,890	2,330	5,330	2,560	5,920	2,150	4,590	6,520	3,940	4,290	3,800	3,980
6	1,840	2,310	4,860	2,400	5,080	1,980	* 3,980	6,730	3,600	4,200	3,750	3,190
7	1,840	2,280	4,560	2,390	6,620	1,850	# 3,570	4,460	3,400	4,110	3,770	2,990
8	1,810	2,310	4,420	2,400	14,100	1,920	# 2,990	8,150	4,070	4,310	3,800	2,980
9	1,800	2,360	4,260	# 2,320	10,900	2,140	# 2,760	14,000	2,800	4,280	3,740	2,990
10	1,800	2,500	3,990	# 2,210	7,760	* 21,200	# 3,250	16,400	2,620	5,350	3,680	2,940
11	1,810	2,600	3,660	* 2,100	10,400	* 25,400	* 3,020	34,000	2,540	5,820	3,650	2,910
12	1,840	2,550	3,700	* 2,020	22,500	10,700	3,980	27,300	2,460	4,100	3,570	2,910
13	1,930	2,430	3,660	* 2,000	17,400	8,200	2,430	13,200	2,430	4,060	3,510	3,160
14	2,220	2,330	3,580	* 1,970	13,700	6,810	1,960	11,300	2,220	5,520	3,430	3,170
15	2,210	2,190	3,450	* 1,950	11,100	5,600	1,810	11,700	2,260	5,890	3,260	3,010
16	2,150	2,260	3,440	# 1,890	7,840	8,680	5,640	11,000	2,320	4,800	3,540	3,000
17	2,120	2,300	3,320	# 1,830	6,610	9,640	3,130	10,000	4,680	3,810	3,340	2,850
18	2,100	2,300	3,300	* 1,760	6,250	7,130	3,700	9,700	12,600	3,530	3,360	2,710
19	2,080	2,270	3,140	* 1,750	5,660	5,720	2,740	* 8,570	14,800	3,350	3,360	2,600
20	2,080	2,280	3,020	* 1,760	5,280	4,390	2,380	7,010	19,300	3,220	3,340	2,700
21	2,080	2,250	3,030	2,910	4,980	3,760	2,400	6,000	16,500	3,120	3,210	2,780
22	2,070	2,290	3,150	12,100	5,450	3,320	2,340	5,460	12,000	3,140	3,300	2,710
23	2,130	2,350	3,160	* 41,200	5,190	2,940	1,780	5,050	9,320	4,670	3,310	2,840
24	2,140	3,390	3,160	* 73,100	4,340	2,670	1,620	4,690	7,620	3,800	3,310	2,610
25	2,130	2,400	3,220	60,400	3,840	2,400	1,500	4,680	6,660	5,100	3,150	2,600
26	2,140	33,200	3,120	76,700	3,720	4,860	1,440	5,170	5,820	5,620	2,990	2,580
27	2,200	40,100	3,030	65,600	3,730	4,190	1,460	4,930	5,590	6,160	2,940	2,600
28	2,220	52,300	2,890	26,900	3,340	2,670	1,410	4,920	5,460	14,800	2,930	2,640
29	2,270			2,930	14,600	3,130	2,540	* 15,300	4,140	5,000	14,200	2,940
30	2,300			2,760	10,900	2,900	7,150	* 15,100	3,820	11,800	2,860	2,620
31	2,290			2,660	3,090	2,940	9,410	3,800	7,420			2,640
Sum	206,770			*428,330		*170,220		281,360		168,130		92,830
	63,040		132,780		235,500		*119,080		184,950		106,310	

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1924-1949			Acre-Feet Normal 1938-1949
	High		Low	Day	Day			Normal	Maximum	Minimum	
	High	Low	Day	Day	Day			Day	Day	Day	
Jan.	124.57	124.00	31	2,330	9	1,770	2,030	125,000	241,156	521,000	105,000
Feb.	141.40	124.36	28	60,200	15	2,170	7,380	410,000	203,615	410,000	112,000
Mar.	136.45	125.60	1	30,700	31	2,600	4,280	263,000	196,491	401,000	108,000
Apr.	146.71	124.65	26	79,500	20	1,720	* 14,300	* 850,000	210,193	* 850,000	61,500
May	135.24	125.35	12	24,700	30	2,830	7,600	467,000	404,038	833,000	98,900
June	136.70	124.41	10	35,000	7	1,810	* 5,670	* 338,000	491,704	1,737,000	74,500
July	134.84	124.20	29	* 29,800	29	1,370	* 3,840	* 236,000	416,058	1,240,000	105,000
Aug.	138.15	126.74	11	43,600	31	3,670	9,080	558,000	402,075	1,280,000	121,000
Sept.	133.42	125.39	20	22,600	14	2,180	6,160	367,000	967,064	3,725,800	79,400
Oct.	131.52	126.15	29	16,600	22	3,000	5,420	333,000	736,853	2,852,270	142,000
Nov.	128.32	125.83	1	6,140	30	2,840	5,540	211,000	298,020	829,260	138,000
Dec.	128.91	125.40	4	6,680	26	2,570	2,990	184,000	247,156	625,260	* 131,000
Yearly	146.71	124.00		79,500		1,370	6,000	*4,342,000	4,832,423	9,554,530	2,643,000
											4,483,951

* Estimated * Partly estimated

CONTRIBUTIONS FROM RIO SAN JUAN

Below Rio Grande City Station

DESCRIPTION: The monthly amounts of water reported below passed through Marte Gómez Reservoir before entering the Rio Grande below Rio Grande City gaging station. The flow was discharged from canals and was measured by current meter. In addition to the water reported below there was an undetermined amount of waste water from drains which entered the Rio Grande from Mexico. Marte Gómez Reservoir is located on the Río San Juan 12.4 river miles above the confluence with the Rio Grande. The zero of the reservoir gage is 7.64 feet above mean sea level. U.S.C. & G.S. datum.

RECORDS: Discharge records were furnished by the Department of Agriculture and Livestock of Mexico. Records available: January 1, 1946 to December 31, 1949. Daily records for 1949 are not available.

REMARKS: In 1949 there were no releases of irrigation water from Marte Gómez Reservoir for use on United States lands in the Lower Rio Grande Valley.

CORRECTION: In 1948, 60,884 acre-feet of water was released from Marte Gómez Reservoir to supplement the irrigation of United States land in the Lower Rio Grande Valley instead of 88,351 acre-feet as reported in Water Bulletin No. 18.

Current Year 1949							Period 1946-1949		
Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High		Low				Average	Maximum	Minimum
	High	Low	Day	Day					
Jan.					54.0	3,320	6,112	15,960	1,410
Feb.					23.3	1,290	1,110	2,090	
Mar.					14.5	888	1,747	2,560	888
Apr.					167	9,920	15,705	37,140	7,100
May					167	10,300	8,432	18,500	0
June					79.1	4,710	6,780	11,870	0
July					44.8	2,770	6,428	18,050	0
Aug					196	12,060	7,586	15,470	686
Sept.					128	7,620	2,130	7,620	0
Oct.					66.4	4,090	1,520	4,090	0
Nov.					6.7	390	1,675	3,360	0
Dec.					31.8	1,950	706	1,950	0
Yearly					81.9	59,308	59,931	85,680	40,970

RIO GRANDE AT HIDALGO, TEXAS

DESCRIPTION: Water-stage recorder on the downstream side of the United States end of the international highway bridge between Hidalgo, Texas, and Reynosa, Tamaulipas, 1,084.8 river miles below the American Dam at El Paso, Texas, and 156.6 river miles from the Gulf of Mexico. Zero of the gage is mean sea level, U.S.C. & G.S. datum.

RECORDS: The peak discharges shown below are based on rating curve supported by 11 meter measurements during the year. Records available: July 1928 to December 1931; September and October 1932; peak flows in September 1933 and in 1934, also January to July and September 1935; peak flows May and October, and full record July and September 1936; full record April 26 to December 31, 1938, and January to November 1939. Mean daily gage-height record and discharges during peaks, 1940 to November 16, 1948. Mean daily gage heights and peak discharges during periods of high flow since November 16, 1948.

REMARKS: When the river at this station reaches a stage of about 100.5 feet, or a flow of about 60,000 second-feet, water begins to flow into two floodway inlets on the United States side, viz.: Hackney Lake Inlet about 4 miles upstream and Mission Inlet about 15 miles above this station, but the river may begin to overflow at Granjeno and Jardín de Flores at stages about 3.5 feet lower.

EXTREME FLOWS: In September 1932 the peak stage was 104.88 feet, with a flow of 83,870 second-feet.

Mean Daily Gage Height in Feet — 1949

Sum

RIO GRANDE AT LAS PALMAS, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with cable car, located 1,640 feet below the Retamal Canal intake, 24.2 river miles below Hidalgo, Texas, and Reynosa, Tamaulipas, and 1,109.0 river miles below the American Dam at El Paso, Texas. Zero of the gage is .85 foot above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 54 meter measurements during the year, 52 by the Mexican and 2 by the United States Section of this Commission. Computations by shifting channel methods. Records available: gage heights from January 13 to October 31, 1945 and daily discharges from November 1, 1945 to April 30, 1949.

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

During the high flow the latter part of April 1949 the gage well and "A" frame on the right bank were washed out. At this time the operation of the station was discontinued.

EXTREME FLOWS: The greatest flow of record was 42,020 second-feet at a stage of 82.15 feet on April 28, 1949. The lowest flow recorded was 14.5 second-feet at a stage of 61.68 feet on May 12, 1948.

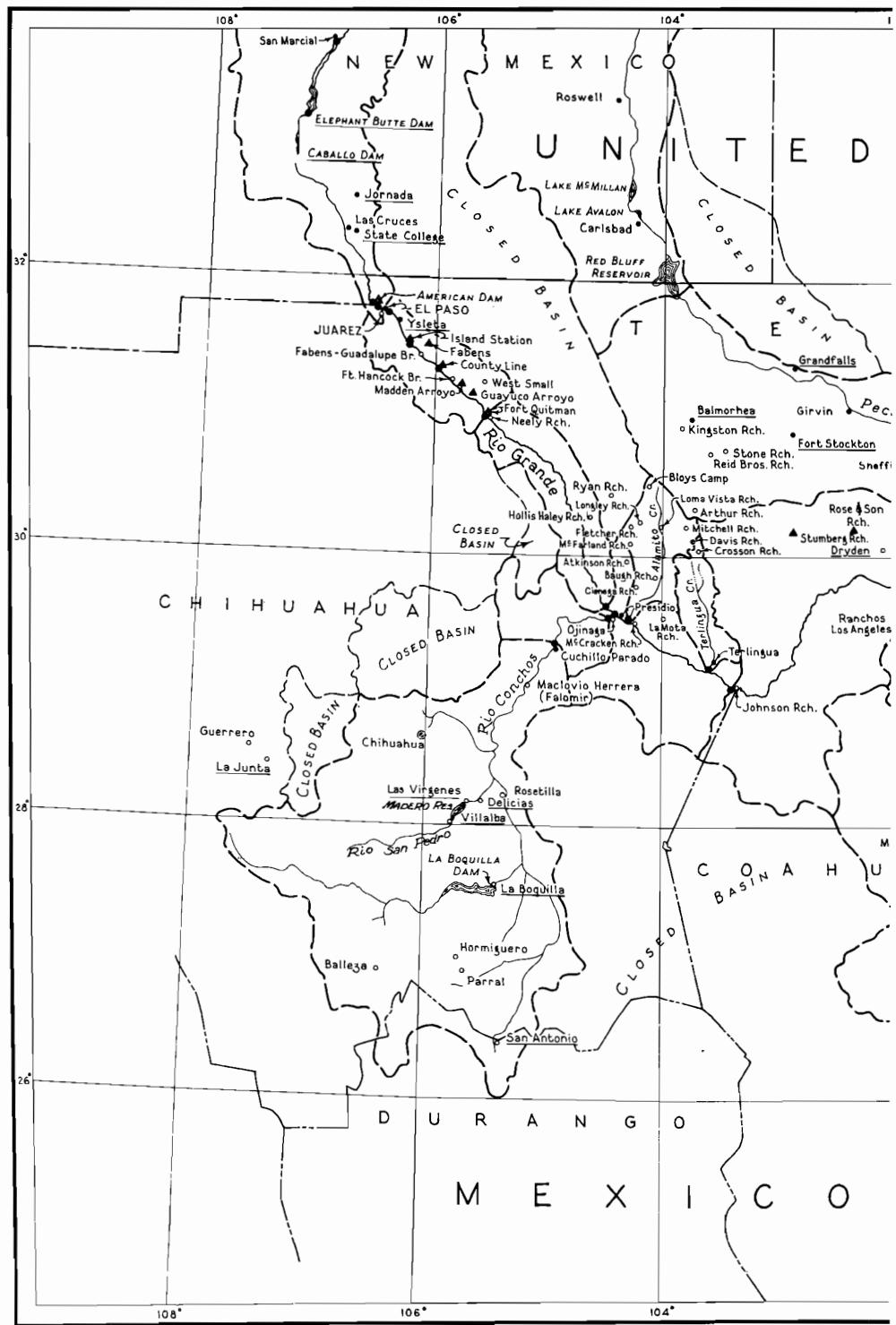
CORRECTION: The discharge records for the last six months of 1948 as published in Water Bulletin No. 18 were found to be erroneous because of inaccurate current meter measurements. The corrected figures are tabulated below.

Mean Daily Discharge in Second Feet — Annual and Period Summary

1948 Revision							1949				
Day	July	Aug.	Sept.	* Oct.	Nov.	Dec.	Jan.	Feb.	March	April	
1	36,730	1,090	1,640	4,700	6,640	1,730	1,400	1,890	31,110	1,550	
2	19,560	1,090	2,760	4,270	5,830	1,580	1,680	1,910	14,200	1,500	
8	7,910	1,790	1,940	3,880	4,940	1,470	1,680	1,900	7,420	1,670	
4	5,300	2,360	1,150	3,390	4,520	1,420	1,250	2,110	5,860	1,830	
5	4,480	1,990	953	2,930	4,410	1,610	* 1,020	2,060	4,910	2,110	
6	3,710	1,730	833	2,510	4,130	1,650	* 1,060	1,900	4,560	2,280	
7	20,870	2,120	473	2,180	3,960	1,410	* 1,060	1,850	4,200	2,030	
8	32,560	2,160	388	2,010	3,570	1,290	1,170	1,860	3,810	1,800	
9	35,670	2,130	353	1,770	3,050	1,260	1,290	1,800	3,500	1,690	
10	35,670	2,250	830	1,870	2,780	1,250	1,310	1,920	3,390	1,700	
11	19,250	1,890	20,520	1,820	2,680	1,270	1,270	1,800	3,280	1,490	
12	8,370	1,720	31,320	1,640	2,590	1,500	1,400	1,740	3,160	1,210	
13	6,250	1,310	35,310	1,640	2,610	1,610	1,540	1,920	3,020	1,120	
14	6,600	1,180	37,430	1,700	2,710	1,320	1,510	1,760	2,520	1,120	
15	5,790	1,240	* 37,790	2,000	2,760	1,370	1,490	1,660	2,710	1,100	
16	5,970	1,180	* 34,780	2,190	2,580	1,250	1,570	1,600	2,610	1,090	
17	4,240	890	* 27,830	4,030	2,480	1,330	1,570	1,550	2,620	1,250	
18	3,400	685	* 22,070	9,920	2,450	1,350	1,670	1,510	2,560	1,450	
19	2,870	639	* 17,130	17,760	* 2,500	1,590	1,860	1,670	2,560	1,410	
20	2,420	565	* 13,630	12,430	* 2,500	1,780	1,720	1,870	2,590	1,440	
21	2,220	555	* 12,610	7,420	* 2,570	1,610	1,620	1,780	2,640	1,300	
22	1,890	713	* 11,300	5,370	* 2,530	1,590	1,560	1,700	2,390	1,300	
23	1,570	1,220	* 9,680	4,590	* 2,300	1,420	1,640	1,750	2,240	9,390	
24	1,450	1,120	* 8,090	4,590	* 2,170	1,510	1,630	1,750	2,200	33,870	
25	1,510	495	* 7,490	12,250	* 2,130	1,590	1,320	2,170	2,170	39,200	
26	1,890	320	* 6,710	15,750	2,080	1,760	1,320	14,830	2,260	* 41,320	
27	1,830	682	* 5,760	14,870	1,980	1,810	1,500	21,260	2,440	* 41,670	
28	1,510	1,170	* 5,090	10,810	2,260	1,460	1,560	27,900	2,290	* 41,670	
29	1,300	1,190	* 4,980	8,370	2,210	1,140	1,590	1,980	1,980	* 39,200	
30	1,160	1,220	* 4,870	7,730	1,970	1,130	1,780	1,770	26,380	1,670	
31	1,060	918		6,890		1,130	1,970				
Sum			39,612	* 183,280	91,890	45,150	46,010	109,220	* 306,140		
285,010			* 365,710						134,640		

1948 Revision and 1949							Period Nov. 1945 - Apr. 1949			
Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			
	High	Low	Day	Day			Average	Maximum	Minimum	
Jul.'48	81.99	66.01	10	• 38,490	31	1,020	9,190	565,300	257,863	565,300
Aug.'48	67.91	64.24	4	2,400	26	286	1,280	78,570	208,470	466,800
Sept.'48	82.48	64.27	#	* 37,790	9	303	* 1,220	* 725,400	* 457,233	* 725,400
Oct.'48	75.33	66.83	19	* 19,110	12	* 1,570	* 5,910	* 363,500	324,653	525,400
Nov.'48	70.73	66.01	1	6,850	30	1,900	3,060	182,300	139,868	182,300
Dec.'48	66.04	64.86	20	1,820	29	1,070	1,460	89,560	114,365	151,100
Yearly 1948	82.48	61.68		38,490		14.5	* 3,660	* 2,659,900	2,430,149	* 2,659,900
Jan.'49	65.94	* 64.73	31	1,970	5	* 996	1,480	91,260	119,872	172,100
Feb.'49	80.05	65.55	28	31,920	18	1,490	3,900	216,600	132,947	216,600
Mar.'49	80.31	66.31	1	32,490	31	1,630	4,340	267,100	127,320	267,100
Apr.'49	# 82.15	65.12	28	* 42,020	16	1,060	* 10,200	* 607,200	* 206,575	* 607,200

* Estimated * Partly estimated # Various days of the month © A maximum flow of 38,100 second-feet at a gage height of 81.76 feet occurred on July 1.



100°

98°

96°

; T A T E S

• Big Spring

• Abilene

A

S

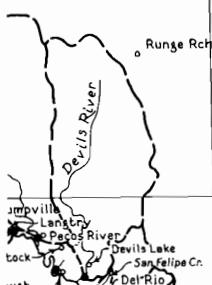
San Angelo

A

Runge Rch

S

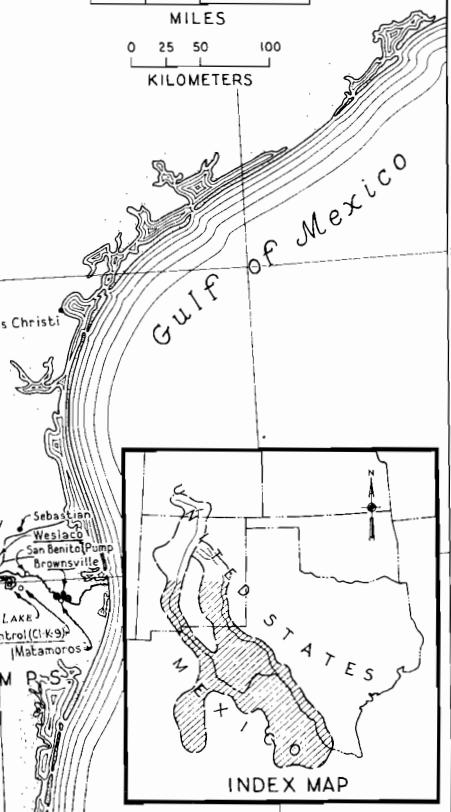
Junction

INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICORIO GRANDE DRAINAGE BASIN
SAN MARCIAL, NEW MEXICO
TO THE GULF OF MEXICO

LEGEND

- Stream Gaging Station
- Non-recording Rainfall Station
- ▲ Recording Rainfall Station
- Watershed Boundary

Note: Evaporation Stations located at, or near, underlined names.

0 25 50 100
MILES0 25 50 100
KILOMETERS

INDEX MAP

100°

98°

96°

**RIO GRANDE FLOODWAY DISCHARGES IN THE LOWER RIO GRANDE VALLEY
In The United States**

During floods water is diverted from the Rio Grande to the United States floodway system at Mission Inlet and Hackney Lake Inlet, approximately 15 and 4 miles, respectively, above the Hidalgo gaging station. Water diverted at Mission Inlet flows through the North Floodway branch, and that entering the Hackney Lake Inlet flows through the South Floodway branch. They join about 5 miles northeast of Hidalgo to flow eastward in the Main Floodway to a point approximately 3 miles southwest of Mercedes. Here the floodwaters may divide, part going northeastward through the Arroyo Colorado Floodway to the Gulf of Mexico, the remainder going to the Gulf via the North Floodway, traveling first northward and then eastward. Mission Inlet flows are measured at the North Floodway South of McAllen Station, Hackney Lake Inlet flows are measured at the South Floodway South of McAllen Station, and North Floodway flows are measured near Sebastian. Arroyo Colorado Floodway flows are measured near La Feria.

The maximum discharge of the Arroyo Colorado during 1949 was 1520 second-feet and occurred during the night of April 29-30 at a gage height of 32.55 feet. Discharge records for 1949 through the North Floodway near Sebastian will be found on the following page.

North Floodway South of McAllen, Texas

Date 1949	Mean Second- Feet	Extreme High		Acre-Feet
		Gage-Feet	Second-Feet	
Apr. 26	1.1			
Apr. 27	207			
Apr. 28	1,150	92.16	1,400	
Apr. 29	748			
Apr. 30	228			
May 1	39.2			
May 2	13.0			
Total	2,386.3			4,730

South Floodway South of McAllen, Texas

Date 1949	Mean Second- Feet	Extreme High		Acre-Feet
		Gage Feet	Second-Feet	
Apr. 26	321			
Apr. 27	3,320			
Apr. 28	4,940			
Apr. 29	1,240	98.91	5,410	
Apr. 30	4.2			
Total	9,825.2			19,500

In Mexico

During the high flow the last few days of April 1949 there was a break in the Rio Grande levee on the Mexican side between Las Palmas and Matamoros stations. The estimated discharge through this break was 3,150 acre-feet.

During the same period of high flow there were several breaks in levees between Matamoros and Lower Brownsville gaging stations. One of these breaks near the Matamoros cemetery was about 500 feet long, and water flowed through it from the river at a depth of about 5 feet. Several thousand acres of land were flooded to a depth of 4 or 5 feet. Part of the overflow water returned to the Rio Grande through two levee breaks about 3,300 and 4,300 feet, respectively, below the Lower Brownsville gaging station. These two breaks were each about 200 feet long. Water flowed through them at a depth of about 5 feet.

There are several regular floodways on the Mexican side which divert excess Rio Grande floodwater to the Gulf of Mexico. The following information is presented concerning such flood flows during 1949:

Retamal Canal - Information on the flow through this canal is shown on page 59.

Floodways Nos. 2 and 3 - There was no flow from the Rio Grande through these floodways during the year.

NORTH FLOODWAY NEAR SEBASTIAN, TEXAS

DESCRIPTION: Water-stage recorder located on the downstream side of the bridge on U.S. Highway 77 about 2.5 miles south of Sebastian, Texas. High flow measurements are made from the highway bridge and low flow measurements are made from a low timber bridge just upstream from the highway bridge. Elevation of zero of gage is at mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 54 current meter measurements made during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: October 1940 to December 1949.

REMARKS: The channel of this floodway in the vicinity of Sebastian serves as a drainage channel as well as a floodway.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: 10,500 second-feet on September 4, 1944 with a gage height of 42.95 feet. Min. sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	#10,000 Sept. 4, 1944	Min.	sometimes dry
Monthly:	Max.	2,110 Sept. 1944	Min.	2.2 Oct. 1940
Yearly:	Max.	218 1944	Min.	39.2 1945

Mean Daily Discharge in Second Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	107	79.0	222	96.7	1,830	60.5	49.8	43.8	41.2	61.8	72.9	73.8
2	131	82.4	190	110	922	58.0	59.5	43.6	49.8	60.5	64.2	89.4
3	113	83.5	163	106	581	48.8	93.8	41.4	57.9	64.3	60.6	91.4
4	82.7	74.5	144	96.6	414	46.1	104	50.2	49.1	76.4	62.3	108
5	66.4	72.2	133	80.5	309	44.1	83.9	74.8	44.7	68.3	64.2	92.2
6	74.2	68.1	124	71.5	235	# 37.0	78.2	65.9	44.1	61.1	63.6	91.9
7	79.0	64.1	113	68.5	160	# 39.7	78.5	* 57.9	65.0	58.1	118	
8	87.0	63.5	108	68.9	187	47.0	72.1	* 41.5	51.6	66.1	56.9	90.8
9	96.6	62.3	116	68.8	195	83.3	68.9	39.2	53.8	* 67.2	59.3	97.9
10	79.2	61.3	110	71.0	128	88.1	82.2	42.0	56.8	* 65.8	56.9	110
11	89.4	63.3	102	77.5	120	87.6	77.6	40.2	* 70.0	62.6	63.3	90.2
12	142	70.6	102	73.0	216	88.6	64.6	47.5	* 55.5	62.4	64.5	74.8
13	137	77.5	96.6	76.5	157	97.6	64.6	45.6	41.4	65.1	70.7	79.1
14	90.1	72.4	119	77.7	112	93.6	63.5	40.7	51.1	61.6	71.7	79.6
15	79.5	64.6	203	78.4	98.4	75.5	66.3	* 39.6	57.1	63.0	64.2	77.1
16	80.1	70.8	117	75.7	* 88.9	69.7	28.8	# 41.1	* 55.0	72.0	61.9	69.4
17	89.5	82.4	74.3	76.0	# 85.6	78.2	88.4	# 42.2	* 51.1	73.5	59.8	67.1
18	118	90.5	75.1	86.5	# 83.9	93.1	77.1	# 44.3	* 56.2	66.4	59.7	73.9
19	98.6	91.3	81.5	92.6	# 82.4	86.5	71.7	# 47.4	* 55.5	65.0	68.6	66.6
20	85.5	91.4	91.6	115	# 80.8	75.9	54.3	# 49.7	60.7	71.4	76.2	74.2
21	94.3	82.4	87.7	90.2	# 79.3	67.4	54.6	# 53.1	67.3	72.8	77.4	79.5
22	102	75.6	76.5	87.6	# 77.8	68.0	50.6	50.1	71.2	77.9	72.4	72.6
23	112	84.6	74.7	196	* 76.3	55.9	53.7	39.7	91.2	97.3	78.9	62.4
24	90.8	97.2	96.1	312	# 84.3	48.5	61.9	38.2	158	97.7	85.7	61.7
25	78.2	90.1	129	728	84.6	41.5	66.3	# 42.9	167	74.0	79.8	61.2
Sum	2,659.6	11,076.2		1,948.3			* 1,478.7	1,317	86.3	82.0	54.8	
	2,956.8	3,477.2		6,996.9			2,134.2	2,088.9	83.1	92.5	58.0	
									106	71.2	93.2	57.8
									106	71.2	81.6	57.2
									106	101	77.6	71.3
									106	90.1	71.3	

Current Year 1949

Period Oct. 1940-1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High	Low			Normal	Maximum	Minimum
Jan.	30.34	28.70	12	166	5	57.9	95.4	5,860	3,536	7,450
Feb.	31.87	28.71	27	307	15	60.2	95.0	5,280	3,368	6,010
Mar.	31.30	28.84	1	243	17	70.0	112	6,900	3,838	6,900
Apr.	38.37	28.81	30	3,040	28	64.9	369	22,000	5,022	22,000
May	38.00	28.31	1	2,790	31	55.9	226	13,900	6,711	24,200
June	29.48	27.88	9	118	6	# 35.6	64.9	3,860	3,910	9,090
July	29.25	28.00	3	112	22	47.1	68.8	4,230	3,619	11,000
Aug.	28.87	# 27.87	5	77.3	23	36.3	* 47.7	* 2,930	2,494	7,400
Sept.	31.82	27.94	24	178	14	39.8	69.6	4,140	23,360	125,700
Oct.	29.74	28.27	24	111	2	60.5	72.6	4,460	4,001	10,200
Nov.	29.50	28.28	28	98.8	10	56.3	70.0	4,170	2,922	6,200
Dec.	29.93	28.42	7	141	29	49.1	78.0	4,790	3,620	6,100
Yearly	38.37	# 27.87		3,040	# 35.6	114	82,520	66,401	158,550	28,412

* Estimated * Partly estimated # Erroneously reported as 10,450 in Water Bulletin No. 14

RIO GRANDE AT MATAMOROS, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and winch. The recorder is attached to the central pier of the railroad bridge over the Rio Grande between Matamoros, Tamaulipas, and Brownsville, Texas, about 57.6 miles upstream from the Gulf of Mexico and 1,183.8 river miles below the American Dam at El Paso, Texas. The cable and car are located .3 mile upstream from the bridge. Zero of the present gage is 15.26 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 208 meter measurements during the year, 202 by the Mexican Section and 6 by the United States Section of this Commission, and a continuous record of gage heights. The river bottom shifts greatly at this station. Computations by shifting channel methods. Records available: 1901 to 1913; 1923 to December 1949.

REMARKS: Reservoirs, diversions, and drainage returns modify the flow at this station. During floods, only a portion of the river flow discharges past this station through the channel of the Rio Grande, as part finds outlet to the Gulf of Mexico through flood channels which lie immediately south of the Rio Grande within 117.4 miles above this

RECORD FLOWS: The greatest recorded flow was on June 22, 1903, when a mean daily discharge

EXTREME FLOWS: The greatest recorded flow was on June 22, 1953 when a mean daily discharge of 36,320 second-feet occurred with a gage height of 13.2 feet. The greatest flow since 1923 was on April 30, 1949 when 32,950 second-feet passed this station with a gage height of 21.62 feet. In 1930 the river at this station was dry for a few days in March and April.

Mean Daily Discharge in Second-Feet 1949 — **Annual and Period Summary**

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	75.9	1,370	25,210	653	24,860	816	286	9,360	2,090	4,660	8,650	650
2	105	1,420	25,430	667	13,310	576	152	6,110	1,730	4,520	5,540	788
3	544	1,720	15,180	953	10,210	202	1,260	4,770	1,590	4,480	4,310	812
4	484	1,920	8,690	1,620	7,660	72.7	2,580	4,130	1,960	4,200	3,670	954
5	389	1,930	6,780	1,860	6,250	30.7	1,820	4,560	3,780	3,880	3,240	1,140
6	213	1,880	5,900	2,050	5,860	29.0	1,060	4,520	3,480	3,110	3,100	2,060
7	87.9	1,770	5,230	2,040	5,090	38.1	717	4,450	2,170	2,590	3,100	3,100
8	38.5	1,430	4,660	1,960	4,480	24.4	932	4,870	1,470	2,420	2,380	2,670
9	169	1,220	4,270	1,820	6,790	32.1	1,220	4,130	1,180	2,390	1,790	1,960
10	345	886	3,950	1,740	8,900	31.1	1,450	6,320	2,370	1,700	1,780	
11	326	692	3,710	1,750	7,980	766	1,680	14,620	1,200	2,350	1,780	2,020
12	255	678	3,490	1,480	8,120	15,820	911	18,960	1,590	2,120	1,880	2,070
13	318	890	3,600	985	17,590	14,130	494	22,180	1,150	2,460	2,120	1,910
14	322	1,440	3,440	766	21,790	6,780	950	16,030	689	2,860	2,420	1,330
15	445	1,330	3,140	675	15,680	4,270	1,080	9,890	410	2,420	1,920	1,010
16	533	862	2,840	667	10,770	3,250	996	7,950	278	2,010	1,090	1,260
17	731	622	2,670	629	8,260	2,400	950	7,560	254	2,150	876	1,670
18	466	664	2,880	660	6,780	2,790	816	6,990	417	2,490	886	2,090
19	600	809	2,660	696	5,830	4,380	960	6,990	682	2,100	908	2,140
20	735	1,220	2,730	720	5,010	3,780	1,080	6,550	5,540	1,700	957	1,690
21	625	1,680	2,950	713	4,450	2,400	1,260	6,600	12,570	1,040	1,210	1,610
22	590	1,410	2,660	798	3,960	1,550	1,160	5,790	15,950	826	1,230	1,540
23	622	982	2,270	936	3,780	901	872	4,340	10,650	826	1,360	1,360
24	936	904	2,060	11,050	3,160	403	791	3,600	9,320	1,120	1,460	1,120
25	798	1,010	1,960	26,170	2,590	168	1,180	2,960	8,020	1,230	1,560	1,600
26	660	4,130	1,960	28,430	2,040	90.1	1,220	2,500	6,820	1,910	1,370	2,060
27	819	20,130	2,190	28,820	1,560	51.9	794	2,380	6,040	2,200	1,300	1,980
28	1,170	23,310	2,210	29,810	1,330	28.3	438	2,790	5,580	2,360	1,360	1,640
29	1,070	1,670	30,720	1,250	63.9	364	3,390	5,400	5,970	953	1,290	
30	1,040	1,110	32,840	1,190	731	287	3,280	5,160	11,550	759	1,220	
31	1,350	823		1,080		9,500	2,680	12,150				1,540
Sum			78,309	214,678	66,585	.3	211,230	98,462				49,864
16,862.3			158,123	227,570	39,260		116,114	64,919				
Current Year 1949							Period 1924-1949					
Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet			Acre-Feet		
	High	Low	High	Low			Day	Acre-Feet	Normal	Maximum	Minimum	Normal
	High	Low	Day	Low	Day	Acre-Feet	Normal	Maximum	Minimum	Normal	1938-1949	

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly
	3.25	- .33	31	1,390	8	20.5	544	33,450	199,399	490,800	33,450	149,139	
18.67	1.57	28	25,810	17	569	2,800	155,300	144,657	328,500	28,470	113,359		
19.82	2.59	2	26,560	31	731	5,100	313,600	118,735	313,600	18,240	106,999		
21.62	1.97	30	32,950	17	614	7,160	425,800	117,890	425,800	2,410	103,082		
21.39	3.15	1	30,620	31	946	7,340	451,400	277,094	721,100	34,630	253,670		
15.19	.59	12	18,190	11	14.8	2,220	132,100	553,644	1,180,500	2,580	285,197		
11.58	1.25	31	15,600	2	112	1,270	77,780	307,493	756,600	22,940	286,859		
18.14	5.41	13	22,850	27	2,330	6,810	419,000	284,934	833,700	12,290	279,954		
13.42	1.15	22	14,160	17	240	3,870	230,300	596,245	1,363,200	24,740	569,491		
12.37	2.40	31	12,470	23	749	3,180	195,300	559,717	1,408,500	28,150	520,626		
11.52	2.03	1	10,660	30	653	2,160	128,800	256,056	827,500	26,820	189,162		
5.77	2.03	7	3,330	1	579	1,610	98,910	195,833	594,200	33,690	133,344		
	21.62	- .33		32,950		14.8	3,680	2,661,830	3,411,697	6,579,500	1,392,980	2,991,319	

RIO GRANDE AT LOWER BROWNSVILLE, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch, located about 1,000 feet below the El Jardín pumping plant, about 6.6 river miles below Brownsville, Texas, and Matamoros, Tamaulipas, 50.4 river miles upstream from the Gulf of Mexico and 1,191.0 river miles below the American Dam at El Paso, Texas. Zero of the gage is at mean sea level, U.S.C. & G.S. datum. An auxiliary water-stage recorder located at the El Jardín pumping plant was used during periods of low flow.

RECORDS: Based on 66 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: January 1934 to December 1949.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. During floods, a portion of the upstream river flow finds outlet to the Gulf of Mexico through flood channels in both countries, which divert from the Rio Grande within 124.6 miles above this station. During floods in April 1949, breaks in the river levee on the Mexican side between Matamoros and Lower Brownsville stations and on both sides below Lower Brownsville Station caused large shifts in the rating curves of both stations.

EXTREME FLOWS: The greatest recorded flow was on October 8, 1945, when a discharge of 31,700 second-feet occurred with a gage height of 31.48 feet. Zero flow has frequently occurred at this station.

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.2	1,350	24,100	682	22,900	600	461	9,330	2,250	4,380	8,460	623
2	.1	1,410	24,000	688	13,800	271	87.0	6,270	1,900	4,240	5,440	750
3	314	1,640	15,200	847	10,300	61.0	750	4,740	1,790	4,240	4,220	829
4	390	1,830	8,770	1,320	7,510	.8	2,250	4,060	1,920	* 3,990	3,400	931
5	304	1,860	7,000	1,550	6,260	0	1,830	4,070	3,220	* 3,820	2,980	1,220
6	161	1,850	6,240	1,750	5,730	.5	1,080	4,300	3,430	3,470	2,810	1,540
7	43.5	1,790	5,640	1,780	5,110	2.7	638	4,460	2,370	3,120	2,850	2,480
8	.2	1,510	4,920	1,770	4,520	.7	740	5,020	1,620	2,950	2,380	2,570
9	0	1,310	4,360	1,600	5,630	2.1	1,110	4,650	1,170	2,910	1,810	2,050
10	103	978	3,980	1,510	8,880	3.0	1,250	4,880	1,020	2,970	1,610	1,800
11	179	760	3,650	1,510	7,790	261	1,530	11,800	1,190	2,760	1,640	1,990
12	140	749	3,570	1,380	7,170	13,900	975	16,200	1,600	2,360	1,730	2,070
13	196	847	3,520	975	15,900	13,900	583	21,900	1,240	2,490	1,940	1,980
14	216	1,250	3,450	746	20,300	7,250	827	16,600	656	2,800	2,180	1,680
15	295	1,240	3,220	*	582	15,800	4,720	10,500	369	2,560	1,940	1,400
16	419	892	2,970	# 571	11,200	3,490	979	7,970	271	2,020	1,210	1,610
17	627	672	2,720	# 475	8,110	2,520	1,050	7,350	195	2,030	926	1,890
18	421	682	2,650	* 486	6,450	* 2,810	942	6,720	275	2,340	916	2,220
19	448	758	2,690	568	5,290	* 4,360	955	6,700	532	* 2,180	980	2,240
20	611	1,030	2,770	600	4,540	* 4,030	984	6,420	4,140	* 1,640	1,070	1,840
21	625	1,460	2,840	574	3,950	2,620	1,100	6,550	9,990	1,070	1,320	1,660
22	580	1,320	2,670	668	3,640	1,600	1,150	5,940	13,500	871	1,400	1,590
23	606	970	2,330	743	3,540	968	921	4,500	10,900	853	1,480	1,440
24	816	831	2,030	9,000	3,180	532	868	# 3,560	9,440	1,040	1,500	1,120
25	776	888	1,860	23,000	2,540	303	1,100	# 3,020	7,810	1,070	1,640	1,480
26	677	2,470	1,840	* 26,900	1,960	174	1,230	* 2,600	6,050	1,490	1,500	1,940
27	745	16,500	1,970	* 27,400	1,420	41.5	944	2,420	6,670	1,920	1,360	.990
28	1,030	21,300	2,060	* 26,600	1,210	7.7	606	2,690	4,960	2,110	1,440	1,750
29	1,070	1,620	2,46,400	1,140	42.7	539	3,240	4,820	4,320	1,060	1,360	
30	1,010	1,150	25,100	1,090	576	475	3,270	4,730	* 9,630	716	1,200	
31	1,290	903		984	7,600	2,790			* 11,200			1,270
Sum		70,127		* 187,775		65,047.7		204,500		* 94,844		50,513
		14,094.0		156,693		217,844		36,537		110.026		63,908

Current Year 1949

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total	Acres-Feet			Acre-Feet
	High	Low	Day	High	Low			Acre-Feet	Normal	Maximum	
Jan.	18.04	31		1,370	\$ 1	0	455	28,000	162,482	299,000	28,000
Feb.	29.87	12.32	28	23,200	17	630	2,500	139,000	122,512	237,000	24,400
Mar.	31.20	13.10	2	24,900	31	788	5,050	311,000	108,181	311,000	18,600
Apr.	32.74	11.89	26	* 28,000	\$ 17	# 425	* 6,260	* 372,000	102,121	372,000	1,130
May	32.64	13.62	1	25,800	31	884	7,030	432,000	265,069	717,000	29,900
June	26.70	12		17,500	\$ 4	0	2,170	129,000	319,024	* 1,161,000	1,380
July	23.02	11.37	31	10,900	3	29.3	1,180	72,500	292,750	759,000	15,500
Aug.	29.55	16.18	13	22,500	27	2,380	6,600	406,000	241,082	679,000	6,000
Sept.	24.88	11.50	22	13,800	17	169	3,670	218,000	549,144	1,337,000	21,300
Oct.	23.97	13.01	31	11,400	24	809	* 3,060	* 188,000	489,042	* 1,427,000	21,700
Nov.	23.35	12.30	1	10,100	30	607	2,130	127,000	186,431	614,000	21,500
Dec.	16.44	12.30	\$ 7	2,740	1	586	1,630	100,000	146,038	341,006	26,800
Yearly	32.74			* 28,000		0	3,480	2,522,500	2,983,877	6,526,000	1,256,500

* Estimated * Partly estimated \$ And other days

STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

In Thousands of Acre-Feet

Data are presented below for all storage reservoirs in the Rio Grande Basin that exceed 15,000 acre-feet in capacity. The monthly figures represent the water in storage on the last day of each month, in thousands of acre-feet. The capacities indicated are at spillway level. Storage figures greater than the capacity indicate that the water surface was above spillway level.

The reservoirs and the sources of the data are: Rio Grande, Continental, Santa Maria, Terrace, Mountain Home, and Sanchez from Colorado State Engineer, Costilla from San Luis Power and Water Company, and El Vado from New Mexico State Engineer. Bluewater data are from the Secretary of the Bluewater-Toltec Irrigation District; Elephant Butte, Caballo, Alamogordo, McMillan, and Avalon from the United States Bureau of Reclamation; Red Bluff from Red Bluff Water Power Control District; Willacy from the Willacy County Water Control and Improvement District No. 1; Boquilla, Colina, and Rosetilla from Rio Conchos Agriculture and Electric Power Company of Mexico; Francisco I. Madero from Ministry of Hydraulic Resources of Mexico; Centenario and San Miguel, Venustiano Carranza, Marte R. Gómez, Culebrón, Villa Cárdenas, and Palito Blanco from the Department of Agriculture and Livestock of Mexico.

CORRECTION: The storage figures for Palito Blanco Reservoir which appear in Water Bulletin No. 18 represent the storage of only one unit in a group of three reservoir units which comprise Palito Blanco Reservoir. The corrected storage figures for 1948 are included herein with similar data for 1949.

In The United States

Month	Rio Grande (Capacity 51.1)		Continental (Capacity 26.7)		Santa Maria (Capacity 43.6)		Terrace (Capacity 17.7)		Mountain Home (Capacity 20.1)		Sanchez (Capacity 103.2)	
	1949	#Normal 1927-1949	1949	#Normal 1928-1949	1949	#Normal 1928-1949	1949	#Normal 1925-1949	1949	#Normal 1924-1949	1949	#Normal 1926-1949
Jan.	16.7	14.1	5.2	5.0	17.1	7.7	1.7	2.7	1.7	4.4	4.8	12.0
Feb.	17.5	15.4	5.8	5.1	17.1	8.4	2.0	3.1	2.1	4.9	5.4	12.1
Mar.	19.5	16.8	6.0	5.2	15.8	9.6	2.2	3.5	2.5	5.2	6.2	12.8
Apr.	21.2	16.8	12.6	5.8	17.3	11.5	2.7	4.2	3.1	5.9	8.3	14.8
May	45.1	26.2	17.7	8.5	27.9	16.9	5.4	7.5	3.7	8.4	14.4	20.7
June	51.4	28.2	26.5	9.5	40.2	19.9	17.7	9.4	8.5	8.4	21.5	19.8
July	43.4	17.0	26.7	7.5	39.5	14.0	9.5	5.9	7.2	6.1	19.9	14.0
Aug.	23.9	7.4	16.2	5.3	24.7	6.6	4.5	3.0	3.8	3.8	11.5	10.6
Sept.	23.9	7.1	16.4	5.4	23.2	6.1	2.0	2.4	3.0	3.3	9.4	11.0
Oct.	25.4	8.6	16.8	5.1	23.3	6.5	3.1	2.6	3.0	3.4	10.5	11.7
Nov.	27.0	12.0	17.3	5.2	22.9	7.3	3.3	2.2	3.2	3.8	11.4	11.7
Dec.	27.7	13.5	17.5	5.6	22.9	7.8	3.5	2.6	3.6	4.1	11.9	11.7
Avg.	28.6	15.3	15.4	6.1	24.3	10.2	4.8	4.1	3.8	5.1	11.3	13.6
Max.	51.4	51.8	26.7	26.7	40.2	42.1	17.7	17.7	8.5	16.5	21.5	62.4
Min.	16.7	0	5.2	0	15.8	0	1.7	0	1.7	0	4.8	1.6

Month	Costilla (Capacity 15.7)		El Vado (Capacity 200.3)		Bluewater (Capacity 43.5)		Elephant Butte (Capacity 2,1976)		Caballo (Capacity 346.0)	
	1949	#Normal 1922-1949	1949	Normal 1935-1949	1949	#Normal 1927-1949	1949	Normal 1915-1949	1949	#Normal 1938-1949
Jan.	4.7	3.8	147.5	58.4	4.2	6.0	496.1	1,012.6	130.5	195.8
Feb.	5.1	4.2	101.3	56.6	4.6	7.1	517.3	1,013.3	158.6	201.6
Mar.	5.6	4.8	17.1	56.6	8.7	11.6	530.5	1,001.6	161.7	182.2
Apr.	7.2	6.0	104.4	116.6	12.5	15.2	508.3	1,007.5	149.0	147.7
May	10.6	8.7	202.7	178.4	10.2	12.9	570.7	1,146.2	163.6	135.4
June	13.2	7.9	202.4	168.1	7.5	10.2	709.9	1,203.9	149.1	108.3
July	11.7	4.7	201.7	139.5	6.8	8.6	793.3	1,144.9	103.3	74.3
Aug.	8.5	3.1	184.2	105.6	4.8	7.3	746.8	1,069.3	41.6	43.2
Sept.	7.6	2.6	169.1	85.1	3.9	7.0	714.0	1,025.7	67.9	39.2
Oct.	7.8	2.9	160.1	77.8	3.8	6.6	663.9	1,015.4	103.1	74.3
Nov.	7.8	3.3	160.3	68.9	3.8	6.4	639.8	1,014.7	147.0	113.4
Dec.	8.3	3.6	162.3	66.2	3.8	6.1	621.0	1,018.3	194.7	153.8
Avg.	8.2	4.6	151.1	98.2	6.2	8.8	626.0	1,056.1	130.8	122.4
Max.	13.2	15.1	202.7	203.5	12.5	47.1	795.4	2,302.8	194.7	346.6
Min.	4.7	0	17.1	2.3	3.8	0	491.6	3.3	33.4	0.1

Some months missing ♦ Daily extreme

STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

In Thousands of Acre Feet

In The United States

Month	Alamogordo (Capacity 132.2)		McMillan and Avalon (Capacity 43.5)		Red Bluff (Capacity 310.0)		Willacy (Capacity 25.0)		Total in United States Reservoirs (Capacity 3,576.2)	
	1949	#Normal 1939-1949	1949	#Normal 1908-1949	1949	#Normal 1936-1949	1949	#Normal 1939-1949	1949	Estimated Normal
Jan.	25.0	59.2	6.7	30.6	35.3	133.4	16.8	15.6	914.0	1,561.3
Feb.	30.4	63.7	7.1	30.9	40.4	137.3	18.6	15.0	923.3	1,578.7
Mar.	32.7	54.3	6.0	29.0	38.9	134.9	17.6	14.1	871.0	1,542.2
Apr.	11.1	43.2	4.5	20.4	24.8	112.9	19.1	13.6	906.1	1,542.1
May	32.5	59.1	3.5	23.9	29.2	128.6	19.0	13.8	1,156.2	1,795.2
June	73.3	55.6	21.6	23.0	32.1	142.2	16.7	14.1	1,391.6	1,828.5
July	103.3	56.2	25.8	19.0	18.0	125.3	15.7	14.7	1,425.8	1,651.7
Aug.	101.4	56.2	19.1	17.1	14.0	108.9	13.6	13.7	1,218.6	1,461.1
Sept.	106.2	54.0	32.9	19.6	59.3	109.5	15.0	15.3	1,253.8	1,393.3
Oct.	99.2	57.2	33.8	22.5	75.4	114.0	13.4	14.8	1,242.6	1,423.4
Nov.	100.5	54.7	30.7	24.2	87.7	119.2	14.3	14.4	1,277.0	1,461.4
Dec.	104.1	58.8	26.9	28.2	98.9	125.0	16.0	16.2	1,323.1	1,521.5
Avg.	68.3	56.0	18.2	24.0	46.2	124.3	16.3	14.6	1,159.4	1,563.4
Max.	106.2	156.3	33.8	85.5	98.9	327.5	19.1	22.0	1,425.8	
Min.	11.1	1.7	3.5	0	14.0	10.0	13.4	3.9	871.0	

In Mexico

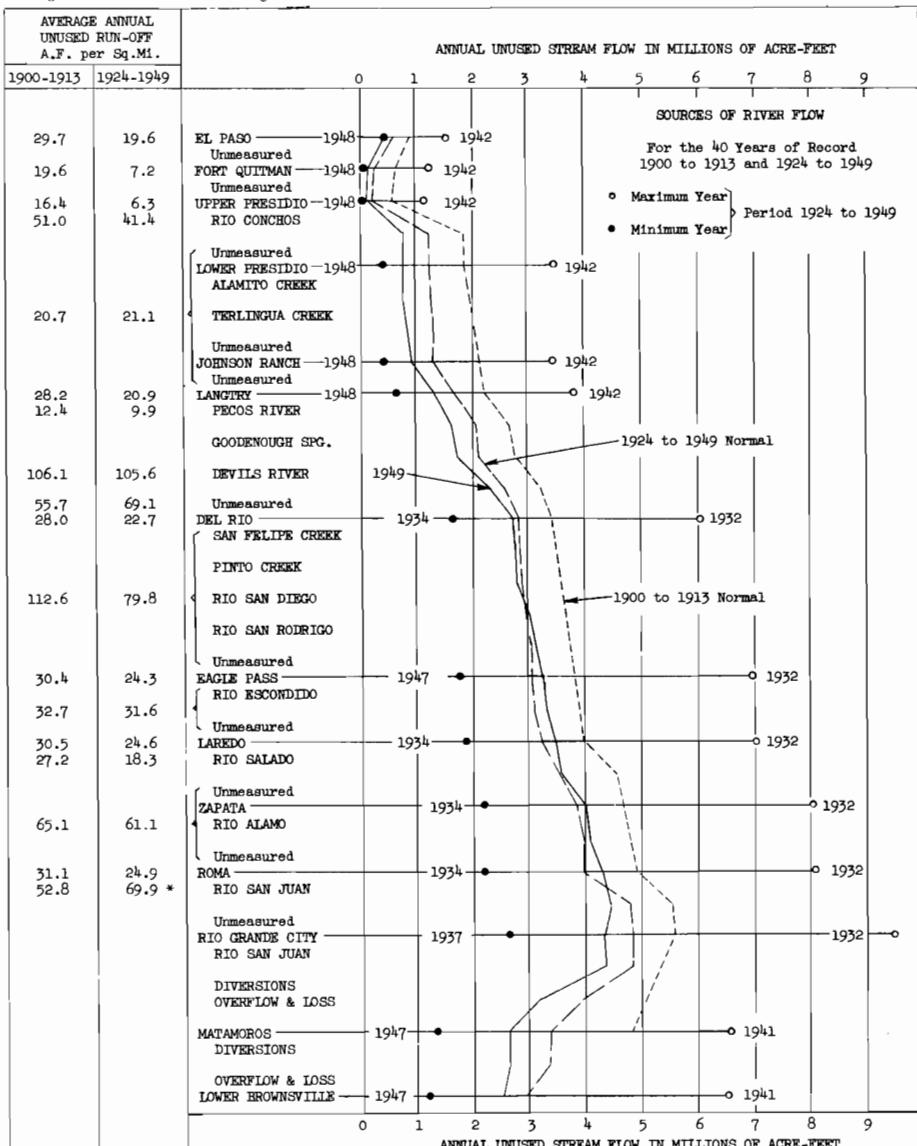
Month	Boquilla (Capacity 2,116.0)		La Colina (Capacity 21.9)		Rosetilla (Capacity 15.4)		Madero (Capacity 344.6)		Centenario and San Miguel (Capacity 19.9)	
	1949	#Normal 1914-1949	1949	Normal 1940-1949	1949	Normal 1940-1949	1949	Average 1948-1949	1949	Normal 1934-1949
Jan.	990.4	1,511.7	18.5	17.7	14.6	13.4	22.1		17.2	13.2
Feb.	962.4	1,480.3	18.2	18.0	14.7	14.5	24.8		20.0	13.1
Mar.	886.5	1,429.6	18.7	17.7	14.8	14.0	25.4		20.5	10.1
Apr.	756.8	1,365.3	19.0	18.4	14.3	13.2	23.5		20.7	8.4
May	709.9	1,301.2	18.6	18.5	12.5	11.1	6.2		19.6	9.8
June	623.7	1,212.4	18.9	18.1	12.7	13.5	23.1		17.7	8.7
July	821.0	1,253.0	17.8	18.5	13.3	13.0	68.4	35.5	15.4	8.6
Aug.	1,081.5	1,427.6	18.2	17.8	14.9	13.2	106.3	54.2	16.9	9.6
Sept.	1,351.7	1,589.7	18.6	18.1	15.2	15.2	255.3	128.4	18.8	12.2
Oct.	1,341.2	1,582.1	18.5	18.1	14.7	14.3	267.6	139.4	20.1	13.7
Nov.	1,287.6	1,543.0	18.6	17.9	15.3	12.8	268.5	141.6	19.0	12.6
Dec.	1,247.5	1,525.3	18.4	17.4	12.5	14.1	267.6	142.6	17.9	12.8
Avg.	1,005.8	1,435.1	18.5	18.0	14.1	13.5	113.2		18.6	11.1
Max.	1,351.7	2,224.5	19.0	20.4	15.3	19.4	268.5	268.5	20.7	20.7
Min.	623.7	37.6	17.8	14.2	12.5	0.4	6.2	1.4	15.4	0.6

Month	Venustiano Carranza (Capacity 1,123.0)		Marte Gómez (Capacity 876.4)		Culebrón (Capacity 704.2)		Palito Blanco (Capacity 124.0)		Total in Mexican Reservoirs (Capacity 4,745.4)		
	1949	Normal 1930-1949	1949	#Average 1943-1949	1949	#Normal 1939-1949	1948	1949	Average 1942-1949	1949	Estimated Normal
Jan.	468.7	426.3	852.9	512.0	42.6	57.8	47.4	53.1	43.8	2,489.1	2,618.0
Feb.	466.0	412.6	822.9	491.9	51.4	52.3	51.3	42.1	38.6	2,422.5	2,546.1
Mar.	433.2	388.9	806.6	407.9	51.3	41.3	48.7	90.9	38.9	2,347.9	2,373.8
Apr.	443.7	376.9	885.3	411.8	116.8	38.9	13.2	99.7	26.5	2,379.8	2,282.9
May	498.2	366.4	978.8	424.6	70.8	43.5	0	114.4	23.6	2,329.0	2,204.9
June	445.4	359.7	790.4	402.1	62.9	54.7	0	106.7	27.5	2,101.5	2,119.8
July	413.5	392.4	736.1	380.0	56.2	49.5	63.1	102.3	36.6	2,244.0	2,146.9
Aug.	427.2	355.3	672.1	437.6	69.0	52.0	45.0	127.6	40.8	2,533.7	2,408.1
Sept.	421.2	410.8	630.7	502.4	78.7	64.8	85.5	123.7	48.2	2,913.9	2,789.8
Oct.	441.9	435.8	608.0	538.4	81.6	70.9	118.1	140.1	67.4	2,933.7	2,880.1
Nov.	441.9	448.0	603.2	531.8	59.8	61.4	113.3	126.3	65.7	2,340.2	2,834.8
Dec.	437.6	450.0	596.7	538.6	50.4	61.0	96.9	110.8	61.4	2,759.4	2,823.2
Avg.	444.9	398.6	740.3	464.9	66.0	54.0	56.9	103.1	43.2	2,524.6	2,502.4
Max.	498.2	1,163.4	885.3	914.5	116.8	116.8	118.1	140.1	140.1	2,933.7	
Min.	413.5	0.7	596.7	2.1	42.6	13.1	0	42.1	0	2,101.5	

Some months missing ♦ Daily extreme * Includes Villa Cárdenas

SOURCES OF RIVER FLOW

The graph and the column of figures on this page each represents data on the annual yield of drainage areas tributary to various stream gaging stations in the Rio Grande Watershed, the graphic values being for the entire tributary area while the column figures are reduced to the yield from one average square mile of the tributary area. Because there were no reservoirs of consequence on the area from 1900 to 1913 the figures in the first column are the same as those in the graph for that period except that the column figures have been reduced to a per-square-mile basis. Because some large reservoirs began storing water between 1913 and 1924 large volumes of unused run-off were not permitted to pass on downstream as unused stream flow until later years when the impounded water was released and added to the stream flow. Elephant Butte and La Boquilla reservoirs illustrate this. Reservoirs which began storing water after January 1, 1924 were on December 31, 1949 retaining large volumes of run-off water which had not yet passed downstream as stream flow. Caballo and Marte Gómez reservoirs illustrate this. The column figures below for the period 1924 to 1949 differ from the corresponding graphic values because of such adjustments between unused run-off and unused stream flow incident to changes of reservoir storage.



* Includes Rio San Juan above and below Rio Grande City

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

DESCRIPTION: An open channel rating station in a concrete-lined canal with two water-stage recorders located 396 and 2,350 feet, respectively, below the head gates at the American Dam near El Paso, Texas. Zero of gages at both recorders is 3,712.09 feet above mean sea level, U.S.C. & G.S. datum. Measurements are made at the downstream end of the first covered section of this canal, 835 feet below lower recorder.

RECORDS: Based on 46 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: June 2, 1938 to December 31, 1949.

REMARKS: This canal diverts water from the Rio Grande at the American Dam near El Paso, Texas, 2.1 river miles above the International Dam near Juárez, Chihuahua. Operation began June 2, 1938. Water from this canal discharges into the Franklin Canal from which water is frequently returned to the Rio Grande at spillways 2.2, 2.7, and 3.6 river miles below the American Dam.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 1,840 second-feet on March 27, 1944. Min., sometimes dry.

Average Flow in Second-Feet

Daily	Max.	1,510	Aug. 13, 1945	Min.	sometimes dry
Monthly:	Max.	1,210	Aug. 1943	Min.	Jan. 1946
Yearly:	Max.	748	1943	Min.	477 1948

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	208	* 62.4	37.9	757	841	697	725	974	816	277	257	232
2	193	* 30.0	37.1	956	838	679	847	968	805	308	257	225
3	66.7	* 47.3	37.4	1,080	736	763	861	876	793	292	265	224
4	* 1.0	53.0	81.9	1,110	652	925	948	865	892	292	211	207
5	* 1.0	58.5	132	1,110	600	814	988	976	922	288	52.3	203
6	* 1.0	57.5	127	778	603	881	971	1,160	791	311	15.3	201
7	* 1.0	50.6	127	761	732	756	974	1,050	825	315	13.3	191
8	* 1.0	49.1	212	1,110	822	670	930	1,100	800	210	37.3	190
9	* .5	79.5	411	1,010	888	668	945	998	828	132	38.8	183
10	.5	71.1	418	820	730	730	1,000	948	990	151	31.9	198
11	* .5	41.7	479	1,040	725	896	1,200	957	1,050	151	29.5	205
12	* .5	46.7	464	912	675	976	1,060	843	945	142	27.6	199
13	* .5	47.1	589	840	681	1,050	1,160	835	969	150	159	196
14	0	43.8	712	843	553	968	1,020	915	839	179	224	180
15	0	50.3	798	780	553	867	1,180	902	902	124	220	169
16	0	44.5	702	627	524	884	1,090	779	857	247	211	168
17	0	43.7	657	628	510	800	1,310	706	787	303	207	168
18	0	43.5	659	739	477	777	1,180	638	611	303	212	164
19	0	46.4	547	723	445	831	1,100	744	465	327	204	164
20	0	46.2	419	748	554	930	1,040	920	390	320	196	232
21	0	42.3	581	718	528	938	961	1,030	104	233	195	252
22	0	42.1	617	697	521	922	859	994	382	134	201	217
23	0	40.7	626	686	761	918	1,160	889	347	136	195	209
24	0	39.5	816	685	735	822	1,160	842	337	130	311	187
25	0	38.8	777	710	768	779	1,180	* 869	312	119	299	181
26	0	37.0	883	672	751	741	1,200	757	294	100	292	168
27	0	34.1	996	589	867	918	1,120	853	259	117	330	170
28	0	35.1	898	566	948	795	872	889	190	116	333	172
29	0	895	611	771	780	595	956	186	96.0	299	174	
30	0	1,080	774	710	689	663	908	184	197	240	177	
31	* 37.0	944	671					880	253			174
Sum		1,322.5		24,080		24,804		28,021		6,453		5,980
		512.2		16,760.3		21,150		31,101		19,172		5,624

Current Year 1949

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period June 1938-1949		
	High	Low	High	Low			Normal	Maximum	Minimum
Jan.	5.14	2.84	1	214	414	0	16.5	1,020	2,285
Feb.	4.14	2.84	1	148	28	28.1	47.2	2,620	11,002
Mar.	10.76	2.98	27	1,580	4	33.1	541	33,200	36,614
Apr.	10.59	7.00	2	1,510	27	534	803	47,800	55,973
May	9.41	6.42	28	1,080	19	418	682	42,000	48,845
June	9.47	7.40	13	1,110	8	604	827	49,200	53,508
July	10.48	7	17	1,480	29	0	1,000	61,700	60,675
Aug.	9.93	7.52	6	1,260	18	625	904	55,600	61,425
Sept.	10.50	4.52	16	1,490	28	155	639	38,000	43,408
Oct.	6.05	3.63	20	350	30	78.6	208	12,800	63,100
Nov.	6.10	2.85	27	362	13	26.6	187	11,200	39,100
Dec.	5.70	4.66	20	290	\$19	158	193	11,900	13,958
Yearly	10.76			1,580		0	507	367,040	424,407
								541,610	346,190

* Estimated * Partly estimated \$ And other days

DIVERSIONS FROM THE RIO GRANDE INTO THE ACEQUIA MADRE
Near Juárez, Chihuahua

DESCRIPTION: Water-stage recorder and bridge for meter measurements located about 260 feet below the canal intake at the International Dam at Juárez, Chihuahua which is 2.1 river miles below the American Dam at El Paso, Texas.

RECORDS: Based on 106 meter measurements during the year, 77 by the Mexican and 29 by the United States Section of this Commission and a continuous record of gage heights. Computations by shifting channel methods. Records available: 1938-1949.

REMARKS: In 1949, 56,190 acre-feet were distributed to lands irrigated in the first unit under the canal. The remainder of the water from this canal was used, together with drainage water (which entered the canal at the lower end of the first unit), to irrigate lands farther down the canal.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 480 second-feet on July 21, 1944 with a gage height of 6.00 feet. Min. dry through winter months.

Average Flow in Second-Feet

Daily:	Max.	339	May 10, 1942	Min.	dry several months each year
Monthly:	Max.	283	May 1938	Min.	dry several months each year
Yearly:	Max.	116	1942	Min.	76.4

1941

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				62.5	175	192	160	157	159	63.7		
2				149	223	163	161	152	164			
3				121	211	171	155	146	155			
4				116	231	165	155	156	161			
5				121	226	157	154	159	155			
6				117	233	170	155	146	156			
7				115	243	155	158	152	196			
8				123	253	151	157	151	165			
9				122	232	156	159	153	160			
10				119	231	167	164	156	168			
11				134	240	174	167	155	166			
12				121	229	167	177	155	174			
13				114	226	164	165	157	159			
14				116	216	156	175	156	165			
15				116	237	159	156	155	177			
16				120	226	159	173	149	145			
17				120	244	156	168	148	168			
18				120	233	154	165	159	166			
19				126	236	164	160	162	172			
20				123	239	164	143	163	172			
21				125	233	167	141	162	157			
22				129	245	166	145	159	155			
23				129	243	165	147	157	164			
24				126	236	162	142	154	155			
25				131	231	161	144	159	143			
26				142	234	164	149	153	154			
27				139	229	162	147	172	158			
28				145	218	160	153	165	179			
29				142	231	160	148	158	178			
30				129	231	160	158	153	156			
31				220	217	16	145	156				
Sum				3,712.5		4,891		4,835		63.7		
				7,135		4,846		4,902				

Month	1938-49		Current Year 1949				Period 1938-1949		
	Average Rainfall Inches **	Day	Extreme Second-Feet		Average Second- Feet	Total Acre-Feet	Acre-Feet		
			High	Low			Normal	Maximum	Minimum
Jan.	.53	1.43	0	0	0	0	0	0	0
Feb.	.27	.22	0	0	0	0	0	0	0
Mar.	.28	.01	0	0	0	0	1,973	5,540	0
Apr.	.19	.07	2	255	1	0	7,360	7,329	11,720
May	.46	.54	8	294	1	118	14,150	13,584	17,380
June	.82	.52	1	252	8	141	163	9,700	10,692
July	1.26	1.52	14	218	14	115	156	9,610	10,219
Aug.	1.29	.65	27	204	#	146	156	9,590	9,596
Sept.	1.21	1.78	28	217	16	60.7	163	9,720	8,293
Oct.	.98	.91	1	161	#	0	2.1	126	119
Nov.	.32	0	0	0	0	0	0	0	0
Dec.	.66	.75	0	0	0	0	0	0	0
Yearly	8.27	8.40		294		0	83.2	60,256	61,805
									83,930
									55,320

Various days of the month ** Average for Valley floor from El Paso to Island Station

**DIVERSIONS FROM THE RIO GRANDE
INTO THE MAVERICK CANAL EXTENSION BELOW THE POWER PLANT**

Near Eagle Pass, Texas,

DESCRIPTION: The Maverick Canal diverts water for power and irrigation from the Rio Grande into Texas at a point 17.4 river miles below the international bridge between Del Rio, Texas, and Villa Acuña, Coahuila and 711.0 river miles below the American Dam at El Paso, Texas. The tail water from the hydroelectric plant (capacity 9,000 kva) returns to the river about 32.2 miles below the point of diversion. The Maverick Canal Extension begins at the hydroelectric plant about 9 miles north of Eagle Pass, Texas. The water-stage recorder is located on a wooden pile bridge about 1 mile below the power plant. Meter measurements are from the bridge.

RECORDS: Based on 24 meter measurements during the year and a continuous record of gage heights. Computations by shifting channel methods. Records available: April 1, 1939 to December 31, 1949.

REMARKS: Irrigation from this canal extension began in June 1938, and in 1949, 22,494 acres of land were irrigated north and south of Eagle Pass. Some waste water from this canal extension reaches the river below the Eagle Pass gaging station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 297 second-feet on November 4, 1944. Min., sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	257	Dec. 3, 1949	Min.		sometimes dry
Monthly:	Max.	230	July 1949	Min.	18.7	March, 1939
Yearly:	Max.	179	1948	Min.	62.1	1939

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	180	118	117	177	75.0	164	222	238	181	165	184	242
2	181	143	118	175	77.2	176	231	205	195	166	192	247
3	187	149	123	175	77.9	194	227	191	191	178	189	257
4	205	148	119	180	75.3	194	221	188	196	169	178	249
5	202	146	117	169	93.0	228	215	173	189	167	176	250
6	205	149	118	175	132	226	217	145	188	188	168	256
7	205	146	121	164	129	217	223	116	196	186	178	249
8	206	137	125	165	119	224	223	92.3	202	200	193	239
9	209	126	125	172	113	122	232	93.5	205	210	191	234
10	205	157	121	179	108	84.8	222	96.4	207	213	183	225
11	198	170	120	176	107	80.5	223	90.4	201	209	180	231
12	193	167	118	171	108	78.9	218	94.2	210	204	179	237
13	172	161	117	171	109	78.5	217	91.4	203	206	188	232
14	142	158	120	176	113	75.2	220	93.2	203	209	185	233
15	141	172	117	179	112	73.2	225	92.9	201	209	183	217
16	139	176	141	175	113	76.9	241	129	163	210	198	215
17	137	186	178	175	114	80.0	235	184	139	217	200	214
18	135	192	175	173	113	106	235	184	137	219	201	215
19	134	198	173	165	116	116	235	181	132	222	199	219
20	144	209	# 170	168	116	134	236	178	124	221	74.1	220
21	186	210	# 160	169	121	176	236	182	126	220	99.2	206
22	187	191	* 121	166	121	200	235	181	124	203	240	204
23	174	131	146	152	118	209	236	172	122	192	233	204
24	155	124	162	124	120	211	234	175	127	81.8	240	201
25	143	118	169	111	133	223	233	166	163	0	238	203
26	137	123	182	91.0	143	216	234	159	162	0	233	207
27	137	125	180	80.0	134	212	233	152	165	0	233	221
28	146	120	175	74.8	93.1	172	241	145	167	0	233	230
29	147	170	76.5	125	192	242	150	170	0	237	245	206
30	147	168	73.4	126	217	237	150	168	41.4	243	206	143
31	126	177	142			242	147			182		
Sum	4,350	4,577.7		4,757		4,635.3		4,888.2		6,951		
	5,205	4,443		3,496.5		7,121		5,157		5,848.3		

Month	1924-49		Current Year 1949				Period 1939-1949			
			Extreme Second-Feet		Average Second-Feet		Total Acre-Feet	Acre-Feet		
	Average Rainfall Inches	Day	High	Day	Low	Second- Foot		Normal	Maximum	Minimum
Jan.	.99	1.95	7	234	31	95.8	168	10,300	8,191	10,600
Feb.	.93	6.55	22	242	25	84.6	155	8,630	7,281	10,600
Mar.	.84	.62	17	203	22	90.4	143	8,810	7,965	12,100
Apr.	1.62	2.46	4	225	28	63.4	153	9,080	7,830	12,200
May	3.17	.69	31	178	1	65.8	113	6,940	6,631	10,900
June	2.41	3.20	8	261	15	72.8	159	9,440	7,299	10,600
July	1.79	1.67	31	256	20	147	230	14,100	8,778	14,100
Aug.	1.82	4.28	1	260	13	76.6	150	9,190	8,122	13,100
Sept.	2.89	3.40	14	234	23	107	172	10,200	7,685	10,800
Oct.	1.71	2.04	19	237	24	0	158	9,700	8,765	11,800
Nov.	.75	T	22	265	0	0	195	11,600	9,277	11,600
Dec.	1.14	1.74	7	275	31	139	224	13,800	9,682	13,800
Yearly	20.04	28.60		275	0	168	121,790	97,506	130,080	44,950

^{*} Estimated * Partly estimated [#] And other days

**DIVERSIONS FROM THE RIO GRANDE
ON THE UNITED STATES SIDE BELOW RIO GRANDE CITY**

The total diversion of 1,223,600 acre-feet to this area was made almost entirely by pumping from the river to irrigate 613,621 acres. Diversions were actually measured for 90% of the acreage. Diversions to the remainder were estimated. Measurements in general were made by Venturi Meters, by open channel rating stations, and Deflection Meters developed by this Commission, although a small part was measured by plant efficiency and power input. There is some re-use of drainage water within the area. Drainage water which escapes from the area does not return to the Rio Grande. In addition to the irrigated area, there were 47,722 acres of dry-farmed land within the area. More than one crop per year is often grown on some of the land.

Average Flow in Second-Feet

Daily:	Max.	4,280	June 23, 1949	Min.	0	Sept. 25, 1949
Monthly:	Max.	3,660	June 1949	Min.	25.2	June 1930
Yearly:	Max.	1,690	1949	Min.	653	1941

Mean Daily Discharge in Second-Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,420	762	94	2,510	270	3,910	3,670	2,570	2,410	393	841	2,290
2	1,230	237	285	1,210	878	3,900	2,930	2,750	2,420	222	1,070	2,000
3	2,200	124	123	777	933	3,630	1,940	2,680	1,680	629	1,300	1,220
4	2,270	400	220	328	1,280	3,330	2,570	2,190	774	607	1,470	1,040
5	2,110	320	3	375	1,680	3,140	3,570	1,500	2,440	1,420	970	2,100
6	2,340	233	76	738	1,780	3,060	3,050	929	2,700	1,400	338	1,520
7	2,300	770	330	749	1,280	5,110	3,080	315	2,780	1,320	1,600	1,720
8	1,490	1,190	306	912	781	2,990	3,020	1,430	2,930	913	2,120	1,720
9	1,360	1,360	684	611	1,760	2,670	2,200	1,920	3,090	727	2,110	1,280
10	2,540	1,620	388	460	2,120	2,670	1,490	1,560	1,830	1,900	1,720	684
11	1,650	1,820	804	1,820	793	3,410	2,430	1,610	1,090	2,250	1,820	549
12	1,280	1,160	358	1,590	224	3,200	2,640	1,860	2,720	2,130	1,260	1,270
13	1,450	542	132	1,790	341	3,700	2,380	1,340	2,910	2,200	722	1,480
14	1,820	1,580	392	1,860	349	3,840	2,140	792	2,930	2,300	2,330	1,170
15	1,550	1,840	907	1,970	187	3,800	1,940	2,290	2,940	2,000	2,450	852
16	1,590	1,960	804	1,820	793	3,840	1,590	2,500	2,750	1,970	2,590	871
17	1,840	1,890	778	1,220	1,110	3,930	1,240	2,600	1,910	2,840	2,730	452
18	1,120	894	788	1,470	1,120	3,710	2,470	1,840	1,720	3,030	2,540	445
19	1,810	487	485	1,480	1,310	3,540	2,320	2,120	3,010	3,210	1,690	1,480
20	1,970	497	135	1,360	1,550	4,180	2,150	1,120	3,240	3,000	1,310	1,480
21	1,650	1,460	678	1,580	1,500	4,140	2,160	790	2,980	2,810	2,070	1,110
22	1,210	1,740	1,100	770	983	4,230	2,310	2,560	2,800	1,990	1,880	1,020
23	1,100	1,580	1,190	376	2,150	4,280	1,500	2,260	1,740	1,470	1,450	1,450
24	2,200	1,460	1,190	243	3,130	4,230	727	2,710	2,66	2,610	1,090	453
25	1,720	969	1,360	477	3,130	4,000	1,520	2,640	0	1,920	1,990	8
26	529	311	844	584	3,180	3,670	1,960	2,430	347	2,240	1,490	366
27	691	62	700	648	3,070	3,730	1,680	1,570	341	2,420	1,330	1,280
28	1,570	68	2,070	583	2,620	3,780	1,770	2,120	392	2,040	2,640	1,830
29	722		2,430	910	2,530	4,000	1,410	2,270	608	1,000	2,390	1,410
30	254		2,540	550	3,230	4,070	1,000	2,510	774	130	2,380	1,110
31	765		2,490	3,620			1,070	2,670	685			760
Sum		27,336		31,221		109,690		59,536		53,776		36,420
47,751		24,412		50,029		65,927		58,522		51,691		

1922-49			Current Year 1949			Period 1922-1949			Acre-Feet		
Month	Average Rainfall		Extreme Second-Feet		Average Second-Feet	Acre-Feet	Acre-Feet			Normal 1938-1949	
	Inches **	High	Low	Day			Normal	Maximum	Minimum		
High	Low	Day	Day	High	Low	Acre-Feet					
Jan.	1.54	.85	10	2,540	30	254	1,540	94,700	41,713	94,700	46,398
Feb.	1.09	2.46	16	1,960	27	62	976	54,200	61,372	134,000	6,960
Mar.	1.18	.60	30	2,540	5	3	787	48,400	85,654	156,000	14,100
Apr.	1.34	2.47	1	2,510	24	243	1,040	61,900	74,594	125,000	29,300
May	3.40	2.07	31	3,620	15	187	1,610	99,200	68,886	135,000	4,510
June	2.69	1.48	23	4,280	9	2,670	3,660	218,000	68,204	218,000	88,423
July	1.91	2.52	1	3,670	24	727	2,130	131,000	72,992	161,000	10,000
Aug.	2.21	1.52	2	2,750	7	315	1,920	118,000	78,505	142,000	19,100
Sept.	4.68	4.44	20	3,210	25	0	1,950	116,000	56,868	129,000	8,020
Oct.	2.19	2.18	19	3,210	30	130	1,730	107,000	60,164	131,000	21,400
Nov.	1.24	.34	17	2,730	6	338	1,720	103,000	61,301	128,000	11,500
Dec.	1.74	1.41	1	2,290	25	8	1,170	72,200	47,125	124,000	10,400
Yearly	25.21	22.34		4,280		0	1,690	1,223,600	777,408	1,223,600	472,500

Mean daily

Period 1938-1949

And other days

Lower Rio Grande area on U.S. side from

Rio Grande City to the Gulf of Mexico

DIVERSIONS FROM THE RIO GRANDE INTO THE RETAMAL CANAL

Near Río Bravo, Tamaulipas

DESCRIPTION: Water-stage recorder and cable with car located .87 mile below Canal head gate. Zero of the gage is .85 foot above mean sea level, U.S.C. & G.S. datum. The head gate is about 1,000 feet from the Rio Grande. This canal diverts from the Rio Grande at a point about 24 river miles below the Hidalgo-Reynosa Bridge near Hidalgo, Texas, and 1,108.8 river miles below the American Dam at El Paso, Texas.

RECORDS: Based on 175 meter measurements during the year. Computations by shifting channel methods. Records available: September 1939 to December 1949.

REMARKS: Retamal Canal has a capacity of about 7,000 second-feet. It empties into Culebrón Reservoir, which in turn discharges into Villa Cárdenas Reservoir from which a canal leads to Palito Blanco Reservoir. These reservoirs are used for irrigation purposes. During Rio Grande floods, floodwater may escape from Villa Cárdenas via Floodway No. 1 to the Gulf of Mexico. During 1949, 95,530 acre-feet of water passed through Floodway No. 1 to the Gulf of Mexico. In 1949, 123,552 acres with irrigation facilities were cultivated under Retamal Canal, of which 93,652 acres were irrigated with 137,400 acre-feet of water.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 6,990 second-feet on September 12, 1944, with a gage height of 76.31 feet. Min. Sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	6,920	Sept. 12, 1944	Min.	sometimes dry
Monthly:	Max.	3,280	Sept. 1944	Min.	sometimes dry
Yearly:	Max.	769	1949	Min.	232 1943

Mean Daily Discharge in Second Feet 1949 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	161	338	5,470	281	2,830	213	417	1,280	420	731	999	197
2	216	344	3,000	268	2,070	202	809	1,130	403	713	770	192
3	222	349	1,730	310	1,690	163	731	1,010	466	678	692	221
4	138	402	1,380	350	1,510	137	551	957	841	632	616	325
5	114	367	1,150	403	1,370	131	403	890	678	586	600	675
6	126	342	1,060	445	1,150	135	378	890	449	530	583	727
7	135	340	950	360	1,010	111	473	925	381	494	540	473
8	157	302	883	289	1,180	68.9	417	879	357	484	494	337
9	175	283	833	281	2,060	63.9	364	883	371	523	470	306
10	160	298	727	301	1,810	76.3	271	2,200	396	516	406	293
11	134	271	639	274	1,500	3,090	221	2,320	331	484	381	309
12	202	277	593	192	2,290	2,990	268	4,270	264	657	389	305
13	243	305	544	150	3,420	1,600	264	3,320	195	646	410	270
14	226	261	509	166	2,840	1,140	325	2,090	189	470	385	268
15	227	243	544	178	2,250	946	210	1,660	156	424	327	337
16	269	244	579	171	1,760	823	131	1,600	119	600	303	353
17	257	225	569	192	1,560	1,160	211	1,510	123	678	278	311
18	265	267	540	238	1,210	1,470	410	1,430	195	505	259	294
19	309	333	519	220	1,060	1,070	344	1,400	1,410	357	262	251
20	242	347	509	203	929	763	342	1,330	1,970	268	315	201
21	225	281	498	200	837	575	242	1,200	2,550	243	333	206
22	219	268	466	198	794	473	189	964	2,310	249	298	226
23	264	255	456	1,650	734	385	159	777	1,680	321	288	225
24	233	263	438	5,190	755	301	200	678	1,410	385	310	248
25	162	326	413	6,430	643	244	184	621	1,120	487	303	264
26	207	2,970	441	6,500	572	234	96.8	604	964	509	263	271
27	261	3,920	480	6,430	544	224	50.5	600	894	593	269	256
28	241	4,840	456	6,740	494	501	42.4	689	876	869	234	208
29	232	351	6,640	459	452	34.3	703	833	1,520	195	183	
30	295	274	4,450	416	275	1,550	558	773	1,870	192	197	
31	331	278	290	1,770	1,770	463		1,490				220
Sum		19,261		49,700		20,017.1		39,831		19,512		9,149
	6,648	27,279		41,837		12,058.0		23,124		12,194		

Month	1922-49		Current Year 1949				Period Sept. 1939-1949		
			Extreme Second Feet		Average Second Feet		Acre Feet		
	Average Rainfall Inches **		High Day	Low Day	Total Acre Feet	Normal	Maximum	Minimum	
Jan.	1.54	.85	31	338	5	108	13,190	14,784	25,790 2,090
Feb.	1.09	2.46	28	5,230	17	213	38,200	12,089	38,200 85.1
Mar.	1.18	.60	1	5,610	30	254	880	54,110	12,851 54,110 0
Apr.	1.34	2.47	28	6,780	13	147	1,660	98,580	17,492 98,580 0
May	3.40	2.07	13	3,510	31	260	1,350	82,980	28,018 82,980 4,490
June	2.69	1.48	11	4,130	9	60.0	667	39,700	31,785 82,400 1,590
July	1.91	2.52	30	2,680	29	31.8	389	23,920	28,454 110,700 360
Aug.	2.21	1.52	12	4,660	31	427	1,280	79,000	35,570 96,180 138
Sept.	4.68	4.41	21	2,670	16	116	771	45,870	67,314 195,100 0
Oct.	2.19	2.18	30	1,970	21	231	629	38,700	62,132 124,600 14,160
Nov.	1.24	.34	1	1,170	30	185	406	24,190	18,234 32,300 3,370
Dec.	1.74	1.41	6	773	29	180	295	18,150	13,946 21,080 3,070
Yearly	25.21	22.34		6,780	31.8	769	556,590	342,667	556,590 168,290

** Lower Rio Grande Valley Area on the U.S. side, Rio Grande City to the Gulf.

MUNICIPAL WATER USES

In Acre-Feet

Tabulated below are yearly and monthly amounts of water pumped from the Rio Grande or tributaries into the municipal distribution systems of several towns along the border. The municipal and industrial water supply for the El Paso area in Texas and Juárez in Chihuahua came from wells prior to November 7, 1943, when the City of El Paso began diverting some water from the Rio Grande for municipal use as shown in the table below. The Del Rio water comes from San Felipe Springs, the Eagle Pass water comes from infiltration wells in or adjacent to the bed of the Rio Grande, the Guerrero water comes from the Rio Salado, and the others from the Rio Grande. Because of changing conditions, the period records are limited here to the past ten years.

The 1949 population figures shown below are estimates based on the 1950 census.

In The United States

Month	El Paso (Pop. 1,30,000)				Del Rio (Pop. 14,000)			
	1949	Period	Nov. 1943-1949		1949	Period	1940-1949	
		Average	Maximum	Minimum		Normal	Maximum	Minimum
Jan.	21.7	48.6	150.3	0	127.3	97.0	127.6	65.9
Feb.	545.0	232.3	651.6	0	144.2	99.8	144.2	64.5
Mar.	778.2	446.7	812.8	65.4	196.6	144.0	211.9	75.5
Apr.	690.0	540.2	690.0	365.6	191.4	156.1	246.8	108.2
May	794.1	588.8	794.1	450.3	223.9	178.8	259.1	95.0
June	957.0	701.1	957.0	536.3	303.1	212.4	305.0	128.1
July	977.0	736.3	977.0	558.1	358.6	239.7	358.6	162.3
Aug.	987.1	688.2	987.1	514.4	330.2	229.0	330.2	124.9
Sept.	771.5	563.5	771.5	207.7	247.1	181.0	247.1	116.5
Oct.	554.1	487.4	762.8	193.4	170.0	134.0	232.9	84.8
Nov.	0	322.7	636.1	0	179.9	121.6	214.8	64.4
Dec.		354.1	818.3	0	146.7	105.4	160.0	61.0
Yearly	7,075.7	5,709.9	8,202.5	4,049.5	2,619.0	1,898.8	2,619.0	1,184.6

Month	Eagle Pass			(Pop. 11,000)			Laredo			(Pop. 50,000)		
	1949	Period 1940-1949			1949	Period 1940-1949			Normal	Maximum	Minimum	
		Normal	Maximum	Minimum		Normal	Maximum	Minimum				
Jan.	62.6	53.7	63.5	44.9	325.8	282.1	370.1	148.2				
Feb.	58.1	54.1	62.7	44.0	301.2	284.1	366.4	186.4				
Mar.	90.5	70.7	90.5	54.5	449.4	372.3	473.8	162.4				
Apr.	64.5	71.3	92.6	60.3	386.0	393.0	544.3	145.5				
May	77.7	72.0	90.0	55.0	564.1	444.6	607.0	194.6				
June	98.2	82.2	108.0	40.0	608.1	476.4	660.7	199.7				
July	104.7	101.5	120.5	77.3	659.4	512.9	659.4	209.1				
Aug.	94.3	98.4	131.3	75.4	658.3	526.0	667.6	285.3				
Sept.	90.7	78.1	90.7	49.6	513.8	423.8	601.1	274.6				
Oct.	62.2	63.5	92.1	41.0	433.3	381.1	549.9	207.6				
Nov.	63.5	59.2	99.9	47.8	398.8	339.3	417.8	182.6				
Dec.	58.8	58.1	70.4	46.2	292.4	303.0	395.8	168.9				
Yearly	919.8	862.8	1,023.7	756.1	5,620.6	4,738.6	5,874.9	2,450.6				

Month	Roma (Pop. *1,560)			Rio Grande City (Pop. 3,760)			Brownsville (Pop. 34,100)					
	Period 1940-1949			Period 1940-1949			Period 1940-1949					
	1949	Normal	Maximum	1949	Normal	Maximum	1949	Normal	Maximum			
Jan.	6.8	6.0	14.3	2.4	30.2	22.3	36.7	14.7	417.6	196.6	417.6	72.3
Feb.	6.8	6.1	12.9	2.4	27.7	21.2	29.5	14.8	391.2	189.3	391.2	96.1
Mar.	9.4	6.0	9.4	2.0	33.0	27.4	35.4	19.9	397.3	214.4	397.3	102.6
Apr.	8.4	6.5	10.7	2.7	32.2	30.3	36.2	18.8	385.1	234.5	461.0	118.9
May	11.8	7.4	11.9	2.2	39.0	33.3	39.0	21.1	458.6	258.4	516.0	102.7
June	13.7	7.6	13.7	2.2	41.0	31.0	41.0	19.4	475.8	271.2	561.0	115.8
July	12.6	8.2	13.0	3.0	41.9	34.7	49.7	17.1	622.8	313.0	622.8	147.5
Aug.	13.5	7.7	13.8	3.5	42.1	37.0	54.0	18.5	586.9	302.7	589.0	162.3
Sept.	13.0	6.7	13.0	2.5	39.5	31.8	40.7	17.1	526.2	256.3	586.2	115.6
Oct.	11.3	6.1	11.3	2.9	38.9	30.1	38.9	19.0	460.7	245.9	460.7	107.0
Nov.	8.2	5.4	8.2	2.6	35.3	26.5	35.4	15.9	491.0	235.4	491.0	104.4
Dec.	7.8	4.9	8.0	2.3	34.0	24.4	36.0	13.9	404.2	225.6	445.0	106.2
Yearly	123.6	78.6	123.6	44.3	434.8	350.0	434.8	218.0	5,617.4	2,943.3	5,617.4	1,452.5

In Mexico

Month	Nuevo Laredo			Guerrero			Matamoros					
	(Pop. 56,000)			(Pop. 1,980)			(Pop. 40,000)					
	1949	Period	1940-1949	1949	Period	1943-1949	1949	Period	1942-1949			
	Normal	Maximum	Minimum		Average	Maximum	Minimum		Average	Maximum	Minimum	
Jan.	215.5	182.4	218.2	94.4	5.3	4.9	5.5	4.3	110.9	81.3	110.9	68.4
Feb.	205.7	150.5	233.3	97.2	5.0	4.7	5.2	4.3	102.2	75.9	102.2	64.0
Mar.	216.5	192.8	288.3	108.6	6.0	5.6	6.3	5.0	117.5	86.3	117.5	68.4
Apr.	244.7	209.2	298.7	132.7	6.1	6.4	7.3	5.6	114.9	85.3	114.9	68.4
May	333.9	229.9	333.9	122.8	7.8	7.5	8.0	7.1	123.6	90.7	123.6	68.4
June	352.9	233.8	352.9	129.6	8.0	8.1	8.5	7.8	117.6	90.1	117.6	68.5
July	394.3	258.1	394.3	115.2	8.8	9.1	10.1	8.8	108.6	94.0	116.2	68.4
Aug.	359.4	267.2	359.4	157.2	9.8	10.3	11.3	9.6	128.5	95.4	128.5	68.4
Sept.	315.0	223.0	315.0	123.1	8.8	8.4	9.0	7.3	105.8	88.8	105.8	68.5
Oct.	306.1	212.8	306.1	124.7	8.9	8.1	8.9	6.5	105.1	93.4	117.4	68.4
Nov.	273.5	185.2	273.5	99.3	7.3	6.5	7.3	4.9	86.0	85.0	110.8	66.8
Dec.	227.1	169.8	247.9	96.3	5.5	5.5	6.3	5.0	85.3	84.0	114.6	70.0
Yearly	3,504.6	2,484.7	3,504.6	1,504.7	87.3	85.1	87.5	82.4	1,306.0	1,050.2	1,306.0	821.1

^a Estimated * In addition to Roma, outlying communities (including San Pedro de Roma in Mexico) having a combined population of 2,850 are served by this system.

SUSPENDED SILT IN THE RIO GRANDE AND SOME TRIBUTARIES AND DIVERSIONS

Water samples for the stations reported were taken in small-necked bottles by two methods.

A. By lowering an open bottle in one or more verticals in the cross section, being careful to approach, but not to strike bottom, thus securing an integrated sample at all depths.

B. By sampling at the surface of the stream, one bottle at the mid-point, and one bottle at each side, one sixth of the stream width from the water's edge. A coefficient of 0.908 is then applied to the average of the three bottles.—From Technical Bulletin No. 362, 1933, U.S. Department of Agriculture.

The gravimetric percentages of dried silt were determined by two methods:

1. By determining the silt in a monthly composite composed by using from each sample a quantity proportional to the river flow represented by that sample. (One filtering, drying, and weighing each month.)

2. By determining the silt in each sample. (One filtering, drying, and weighing for each sample.)

For ease of comparison the assumption is made that 1,452 tons of silt will occupy one acre-foot in a reservoir, which is equivalent to saying that one cubic foot of silt thus situated would weigh 66.7 pounds.

Revision: Revised 1948 silt data for the Rio Grande at Las Palmas is included herein.

Month	1949					Period of Record		
	Tons		Number of Samples	Gravimetric Percentages				
	Water	Silt		Average	Maximum Sample	Minimum Sample	Acre-Feet at 1,452 Tons Per Acre Foot	Average

Rio Grande at El Paso									Period September 1947-1949
Jan.	14,678,000	2,010	29	.01370			1.4	.82	1.4 .25
Feb.	11,063,000	1,230	28	.01110			.85	.59	.85 .33
Mar.	46,819,000	19,900	28	.04240			13.7	9.3	13.7 4.9
Apr.	77,749,000	39,000	28	.05020			26.9	30.2	33.5 26.9
May	76,369,000	19,300	29	.02530			13.3	38.3	63.3 13.3
June	80,258,000	20,600	28	.02570			14.2	31.1	48.0 14.2
July	99,848,000	55,900	30	.05600			38.5	43.0	47.5 38.5
Aug.	89,009,000	28,100	30	.03160			19.4	38.1	56.8 19.4
Sept.	70,055,000	134,000	30	.19100			92.3	46.3	92.3 23.3
Oct.	27,288,000	3,870	31	.01420			2.7	2.0	2.7 1.0
Nov.	20,245,000	2,130	30	.01050			1.5	1.2	1.5 .80
Dec.	16,646,000	1,190	30	.00716			.82	1.1	2.1 .45
Yearly	630,027,000	327,230	351	.05190			225.57	242.01	283.48 225.57

Samples by U.S. Section, Method A; Analyses by U.S. Section, Method 1

Rio Conchos at Cuchillo Parado									Period 1945-1949
Jan.	49,308,000	0	14	0	0	0	0	0	0 0
Feb.	84,888,000	5,770	12	.00620	.0272	0	4.0	.80	4.0 0
Mar.	67,659,000	0	13	0	0	0	0	0	0 0
Apr.	20,576,000	0	13	0	0	0	0	0	0 0
May	24,566,000	33,200	13	.1350	.7220	0	22.9	10.2	28.2 10.2
June	19,015,000	2,220	13	.0117	.1720	0	1.5	26.4	126 0
July	100,986,000	1,163,000	17	1.1520	2.8290	0	801	383	890 0
Aug.	151,888,000	1,376,000	17	.0606	2.5280	0	948	322	948 4.8
Sept.	139,350,000	1,129,000	16	.0100	2.4530	0	778	488	1,190 .32
Oct.	106,045,000	50,800	13	.0479	.1860	0	35.0	292	997 0
Nov.	85,442,000	0	13	0	0	0	0	0	3.6 0
Dec.	61,095,000	0	13	0	0	0	0	0	0 0
Yearly	910,888,000	3,759,990	167	.4130	2.8390	0	2,590.4	1,523.12	2,590.4 229.8

Samples by Mexican Section, Method B; Analyses by Mexican Section, Method 2

Rio Grande at Langtry									Period April 1 1944-1949
Jan.	73,943,000	11,200	6	.0151			7.7	8.3	11.4 2.9
Feb.	107,153,000	53,600	5	.0500			36.9	12.1	36.9 3.3
Mar.	96,392,000	39,200	5	.0407			27.0	9.3	27.0 2.7
Apr.	83,154,000	76,000	5	.0914			52.3	23.9	66.4 1.1
May	65,799,000	132,000	7	.2000			70.9	142	448 3.7
June	156,762,000	1,110,000	8	.7080			764	334	929 2.8
July	139,469,000	2,633,000	10	1.8880			1,810	1,283	4,483 60.9
Aug.	337,661,000	4,445,000	12	1.3460			3,130	1,076	3,130 4.7
Sept.	274,156,000	2,955,000	11	1.0780			2,040	1,818	3,280 82.6
Oct.	228,415,000	1,061,000	10	.4730			731	1,212	3,261 48.3
Nov.	135,350,000	69,400	6	.0513			47.8	30.9	58.6 12.6
Dec.	105,617,000	14,700	4	.0139			10.1	15.1	46.8 5.7
Yearly	1,799,871,000	12,700,100	89	.7060			8,747.7	5,924.6	8,747.7 1,347.2

Samples by U.S. Section, Method A; Analyses by U.S. Section, Method 1

Pecos River									Period June 1943-1949
Jan.	18,393,000	677	15	.003680			.47	.44	.74 .15
Feb.	18,155,000	3,050	15	.016200			2.1	.80	2.1 .13
Mar.	17,131,000	2,090	14	.012200			1.4	.73	1.4 .29
Apr.	10,149,000	60,500	21	.11700			41.7	7.4	41.7 .19
May	40,142,000	11,900	15	.02940			8.2	6.0	8.2 .17
June	26,078,000	5,260	17	.01250			2.2	4.6	15.7 .62
July	10,082,000	73,000	17	.10300			30.3	22.5	67.1 .19
Aug.	42,893,000	29,000	18	.06160			20.0	3.2	20.0 .18
Sept.	27,432,000	15,600	16	.04970			9.4	5.1	9.4 .15
Oct.	30,405,000	14,400	15	.04730			9.9	.34.3	176 .22
Nov.	22,312,000	595	15	.00266			.41	.39	1.2 .05
Dec.	18,261,000	1,710	16	.00937			1.2	.61	1.3 .04
Yearly	354,098,000	213,780	194	.05570			147.28	83.87	199.36 17.09

Samples by U.S. Section, Method A; Analyses by U.S. Section, Method 1.

SUSPENDED SILT IN THE RIO GRANDE AND SOME TRIBUTARIES AND DIVERSIONS

Month	1949			Period of Record		
	Tons		Number of Samples	Gravimetric Percentages		Acre-Feet at 1,452 Tons Per Acre Foot
	Water	Silt		Average	Maximum Sample	
						Average

Rio Grande at Eagle Pass

															Period
Jen.	154,570,000	19,800	26	.0102			10.9	23.2	124	.07					1934-1949
Feb.	514,180,000	1,112,000	37	.2605			768	62.5	768	2.6					
Mar.	236,874,000	76,000	30	.0265			52.3	28.5	52.3	3.0					
Apr.	367,006,000	677,000	28	1.804			466	77.3	466	3.0					
Mey	379,229,000	471,000	31	1.1240			344	59.1	4,220	17.7					
June	327,849,000	915,000	30	.2790			630	1,093	4,340	4.3					
July	327,094,000	1,750,000	31	.5350			1,210	1,309	7,840	12.0					
Aug.	705,432,000	3,633,000	30	.5150			2,500	1,157	5,310	14.8					
Sept.	470,612,000	3,680,000	29	.7820			2,530	2,882	10,800	13.0					
Oct.	422,925,000	1,167,000	31	.2760			804	1,162	5,820	24.0					
Nov.	271,940,000	816,000	30	.3000			562	122	562	12.3					
Dec.	221,935,000	.48,400	21	.0218			33.3	24.8	84.1	1.1					
Yearly	4,478,251,000	14,364,200	354	.3210			9,890.5	8,545.1	20,842.8	1,768.3					

Samples by Mexican Section, Method A; Analyses by U.S. Section, Method 1

Río Alamo

										Period	1934-1941
Jen.	1,077,000	0	8	0	0	0	0	0	3.0	21.8	0
Feb.	5,046,000	9,590	8	.1900	.295	0	0	6.6	.45	6.6	0
Mar.	1,761,000	0	5	0	0	0	0	0	10.3	91.6	0
Apr.	46,195,000	74,800	3	.1620	.236	0	0	51.5	.266	227	0
May	30,145,000	104,000	9	.3460	.489	0	0	71.6	.497	230	2.2
June	5,376,000	3,270	7	.0941	.186	0	0	2.3	.655	471	0
July	3,728,000	4,850	1	.1303	.228	0	0	3.3	.2006	.998	0
Aug.	0	0	7	0	0	0	0	0	1,610	0	
Sept.	17,969,000	55,200	8	.3070	.468	0	0	38.0	.286	2,920	1.5
Oct.	3,158,000	7,680	7	.2220	.317	0	0	5.3	.949	.558	0
Nov.	902,000	0	7	0	0	0	0	0	.98	.52	0
Dec.	1,427,000	0	6	0	0	0	0	0	1.4	16.1	0
Yearly	115,988,000	259,390	83	.2240	.489	0	178.6	747.43	3,156.57	154.5	

Samples by Mexican Section, Method B; Analyses by Mexican Section, Method 2

Rio Grande at Roma

	Rio Grande at Roma					Period March 1929-1945		
Jen.	163,116,000	9,120	30	.0059		6.3	39.2	.169 .41
Feb.	546,387,000	1,470,000	28	.26900		1,010	73.8	1,010 .83
Mar.	341,165,000	172,000	30	.05050		118	132	1,850 1.3
Apr.	1,162,970,000	4,036,000	29	.34700		2,780	368	2,780 .76
May	527,814,000	760,000	29	.14400		523	1,214	5,250 15.4
June	479,804,000	1,315,000	29	.27400		906	1,342	7,220 10.6
July	327,121,000	1,119,000	31	.34200		771	1,357	9,070 11.1
Aug.	750,444,000	5,295,000	31	.00000		3,610	1,450	3,610 34.4
Sept.	565,132,000	2,332,000	30	.14300		1,160	3,721	18,000 13.4
Oct.	472,443,000	95,000	31	.21100		687	2,094	9,240 89.2
Nov.	287,009,000	296,000	29	.10300		204	155	660 4.8
Dec.	256,251,000	83,300	31	.03250		57.4	34.7	319 1.0
Yearly	5,860,515,000	17,825,420	358	.30400		12,262.7	12,000.7	30,859 2,314.0

Samples by Mexican Section, Method A; Analyses by U.S. Section, Method 1

Retamal Canal

														Period	1943-1944
Jan.	17,921,000	2,330	13	.0130	.0155	.0080		1.6		4.5		10.1		1.6	
Feb.	51,921,000	287,000	14	.5520	.9890	.0070		198		29.8		198		.21	
Mar.	73,535,000	243,000	14	.3300	1.1160	.0073		167		25.5		167		.14	
Apr.	135,975,000	1,655,000	18	1.2350	1.4960	.0090		1,140		184		1,140		0	
May	112,779,000	575,000	15	.5100	.9100	.0345		396		153		396		1.1	
June	55,960,000	192,000	15	.3965	.9990	.0099		132		181		400		.25	
July	38,505,000	119,000	15	.3965	1.4370	.0090		103		173		661		12.1	
Aug.	31,372,000	965,000	17	.8040	1.3520	.2410		594		241		5		2.6	
Sept.	62,000,000	339,000	14	.3580	.9260	.0275		231		550		946		0	
Oct.	52,599,000	161,000	15	.3070	.6500	.0663		111		371		1,530		6.5	
Nov.	32,871,000	59,200	13	.1800	.3380	.0212		40.8		13.8		40.8		3.6	
Dec.	24,663,000	12,200	12	.0495	.1990	.0066		8.4		3.6		8.4		.60	
Yearly	756,435,000	4,533,730	173	.5990	1.5120	.0066		3,122.8		1,710.2		3,122.8		326.2	

Samples by Mexican Section, Method B: Analyses by Mexican Section, Method 2

Rio Grande at Las Palmas

Rio Grande at Las Palmas										Period 1946-1949	
Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Jan. *49 124,028,000	19,100	11	.0154	.0211	.0091	13.2	48.0	149	12.5	12.0	12.1
Feb. *49 294,422,000	1,905,000	14	.6470	.14420	.0094	1,310	347	1,510	12.1	4.8	4.8
Mar. *49 362,946,000	1,390,000	14	.3830	1.2260	.0112	957	246	957	4.8	5.9	5.9
Apr. *49 * 823,255,000	* 10,794,000	13	1.3080	1.9080	.0112	* 7,450	* 1,921	* 7,450			

1948 Revision

July 148	768,296,000	5,217,000	17	.6790	1,2400	.1200	3,590	1,275	3,590	102
Aug. 148	106,781,000	123,000	12	.1150	.1250	.0999	84.7	941	2,550	84.7
Sept. 148	965,837,000	* 7,690,000	7	.7800	.8220	.0464	* 5,300	* 2,874	* 5,300	1,210
Oct. 148	* 494,064,000	= 477,000	0	= .0966			= 329	= 1,895	= 5,300	54.2
Nov. 148	247,706,000	179,000	13	.0723	.1250	.0009	123	83.0	123	46.1
Dec. 148	121,710,000	8,640	11	.0071	.0146	.0030	6.0	17.0	33.8	6.0
Yearly 148	3,614,963,000	16,088,240	139	.4450			* 11,082.1	* 10,501.9	12,929.2	7,894.5

Samples by Mexican Section. Method B: Analyses by Mexican Section. Method 2

* Estimated * Partly estimated

CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE AND TRIBUTARIES 1949

The following chemical analyses are from composites made up periodically from independent water samples composed by taking from each sample an amount of water proportional to the volume of river flow represented by that sample. This compositing and the determination of the electrical conductivity of the individual water samples was done by the United States Section of the International Boundary and Water Commission. The chemical analyses were made by the Rubidoux Laboratory of the United States Department of Agriculture at Riverside, California.

To convert "Milligram Equivalents" to parts per million by weight, multiply each ion by its appropriate conversion factor. These factors are (HCO_3 , plus CO_3), 30.5; Cl, 35.5; SO_4 , 48; Ca, 20; Mg, 12.16; Na, 23; NO_3 , 62. To convert tons per acre-foot to parts per million, multiply tons per acre-foot by 735.5.

Electrical conductivity, reported in the following tables as $\text{EC} \times 10^6$ @ 25°C , is a relative measure of the total salt concentration in the water samples.

Month	No. of Sam- ples	Dissolved Solids		Mean $\text{EC} \times 10^6$ @ 25°C	Boron p.p.m.	pH	% Na --	% Cl ---	Mean Milligram Equivalents per Liter				
		Tons Per Acre Foot	Total Tons						Ca	Mg	Na	CO_3 + HCO_3	SO_4

Sampling by Bureau of Reclamation

Rio Grande at Caballo Dam													
Jan.	28	1.05	164	1,210	.19	7.9	65	20	2.59	1.77	8.16	5.72	4.29
Feb.	28	1.05	125	1,210	.09	7.9	65	20	2.59	1.77	8.16	5.72	4.29
Mar.	31	.59	55,900	654	.09	7.9	39	20	3.02	.95	2.58	2.83	2.51
Apr.	30	.60	60,600	660	.10	8.0	39	18	3.05	.95	2.60	2.96	2.56
May	31	.61	58,500	672	.09	8.1	40	17	3.08	.94	2.69	3.00	2.66
June	30	.60	67,800	673	.12	8.0	40	17	2.98	.96	2.66	3.00	2.69
July	31	.59	79,600	669	.08	8.0	41	17	2.95	.95	2.69	3.00	2.68
Aug.	31	.59	76,100	671	.10	7.9	41	18	3.00	.97	2.75	2.95	2.58
Sept.	30	.57	18,000	630	.10	8.0	40	20	2.88	.92	2.55	2.77	2.39
Oct.	31	.80	10,400	893	.11	7.9	48	23	3.52	1.19	4.34	3.80	3.24
Nov.	30	.68	4,070	766	.15	8.0	46	20	5.15	1.05	3.52	3.56	2.65
Dec.	31	.82	1,970	941	.15	8.0	52	21	3.15	1.44	5.04	4.70	3.07
Mean δ		.634	.600	627,229		671		41	18	3.01	.960	2.71	2.98
Period Average		.710	.589,000			781		44	18	3.32	1.17	3.51	2.78
Tons of Constituents, 1949										58,400	11,300	60,400	88,000
Average Tons Period 1931-1949										75,000	16,000	90,900	95,600
												122,000	126,000
												207,000	204,000
												58,100	

Sampling by Bureau of Reclamation

Rio Grande at Leasburg Dam													
Jan.	31	1.15	2,790	1,240	.24	7.9	46	25	5.02	1.87	5.86	3.40	6.32
Feb.	4	1.18	2,120	1,210	.17	7.8	48	26	4.41	1.90	5.88	2.72	6.41
Mar.	31	.64	50,400	706	.12	8.1	42	22	3.47	.95	2.40	2.97	2.69
Apr.	30	.61	59,100	695	.12	8.2	45	21	2.75	1.02	3.08	2.57	2.92
May	31	.60	64,500	687	.12	8.2	46	20	2.98	1.05	3.21	2.49	3.11
June	30	.60	66,000	725	.11	8.2	46	21	1.04	1.04	3.08	2.45	3.09
July	31	.61	78,100	687	.12	7.6	46	20	2.98	1.05	3.08	2.46	3.00
Aug.	31	.65	80,000	725	.11	7.9	43	19	2.98	1.06	3.10	2.77	3.04
Sept.	30	.75	37,700	835	.12	7.8	42	20	3.62	1.17	3.46	3.32	3.46
Oct.	31	.76	10,700	860	.15	8.2	42	21	3.85	1.19	3.69	3.27	3.71
Nov.	30	.85	6,710	919	.15	8.0	44	22	4.07	1.33	4.18	3.28	4.32
Dec.	31	1.03	4,760	1,150	.21	7.8	45	23	4.88	1.60	5.22	3.80	5.41
Mean δ		.665	.645	458,280		726		44	20	2.93	1.06	3.16	2.69
Period Average		.610,000		836				44	20	3.56	1.25	3.83	2.39
Tons of Constituents, 1949										55,000	12,100	68,100	76,900
Average Tons Period 1931-1949										77,100	16,400	95,300	95,200
												139,000	148,900
												212,000	216,800

Sampling by U. S. Section

Rio Grande at El Paso Station													
Jan.	29	1.59	17,200	1,770	.37	7.9	64	26	4.21	2.13	11.17	2.95	8.26
Feb.	28	1.66	13,500	1,860	.30	8.1	65	37	4.17	2.18	11.96	2.83	8.68
Mar.	28	.94	38,300	1,040	.17	8.0	54	30	3.35	1.34	5.47	2.77	4.49
Apr.	28	.59	50,900	1,010	.17	7.9	56	30	2.89	1.41	5.42	2.45	4.49
May	29	.95	58,300	1,070	.22	8.0	55	30	3.20	1.58	5.68	2.71	4.67
June	28	.96	56,700	1,080	.19	7.8	52	27	3.72	1.58	5.65	3.35	4.65
July	30	.93	68,400	1,050	.16	7.9	53	27	3.60	1.59	5.54	3.14	4.58
Aug.	30	.93	60,900	1,070	.17	7.9	55	29	3.26	1.42	5.78	2.70	4.78
Sept.	30	1.05	54,100	1,170	.20	7.8	56	31	3.49	1.51	6.42	2.77	5.29
Oct.	31	1.40	28,100	1,610	.28	7.9	63	55	3.78	1.99	9.87	2.95	7.38
Nov.	30	1.43	21,300	1,640	.30	7.9	63	55	3.88	2.07	13.16	3.01	7.52
Dec.	30	1.48	18,100	1,680	.27	7.8	68	58	3.26	2.06	11.13	2.25	7.96
Mean δ		1.451	1.02	473,800		1,160		57	31	3.42	1.50	6.41	2.65
Period Average		1.11	634,000	1,220				52	30	4.40	1.61	6.42	3.48
Tons of Constituents, 1949										43,200	11,500	92,900	54,800
Average Tons Period 1930-1949										68,700	15,300	119,000	82,800
												156,000	178,700
												204,000	104,000

* Total T Trace * Weighted mean ** Percent of total cations *** Percent of total anions # Estimated, composite sample broken in transit to laboratory

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES—1949**

Month	No. of Sam- ples	Dissolved Solids			Mean ECx10 ⁶ @25°C	Boron p.p.m.	pH	% Na **	% Cl **	Mean Milligram Equivalents per Liter																	
		Tons Per Acre Foot	Total Tons	Mean Tons																							
										Ca	Mg	Na	CO ₃ + HCO ₃	SO ₄	Cl	NO ₃											
Sampling Jointly by Both Sections																											
Rio Grande at Fort Quitman																											
Jan.	4	3.29	39,500	3,700	.34	7.8	62	56	10.14	4.18	23.37	4.45	12.12	21.50	.05												
Feb.	5	3.37	25,200	3,800	.37	7.8	63	56	10.39	4.32	24.56	4.62	12.51	22.10	.04												
Mar.	7	4.08	18,700	4,580	.44	7.9	64	61	11.52	4.46	30.01	3.86	14.33	29.00	.01												
Apr.	6	5.68	22,000	6,310	.61	7.8	66	66	14.56	7.64	42.98	3.50	18.94	43.40	.01												
May	4	5.76	32,100	6,460	.58	8.0	65	66	15.72	7.83	43.65	4.48	18.85	44.42	.01												
June	5	5.64	38,800	6,200	.59	7.8	65	65	14.87	7.56	42.44	4.28	18.46	42.72	.01												
July	5	5.75	45,100	6,340	.62	7.8	65	66	15.21	7.73	43.10	3.86	18.90	43.80	.03												
Aug.	6	5.39	37,100	6,010	.58	7.9	65	65	14.38	7.22	40.31	4.26	17.69	40.60	.01												
Sept.	6	2.32	69,100	2,660	.32	8.1	62	55	7.17	2.96	16.32	3.25	8.75	14.55	.04												
Oct.	6	3.24	63,200	3,670	.43	7.7	63	57	9.42	4.06	25.38	3.80	12.07	21.48	.03												
Nov.	7	2.98	51,300	3,420	.42	8.0	63	55	9.09	3.85	21.68	4.17	11.41	19.04	.08												
Dec.	5	3.23	43,000	3,610	.42	7.9	62	56	9.87	4.01	22.98	4.50	11.87	20.54	.04												
Mean \bar{x}	6	3.58	480,100	4,030	.430	7.90	64	60	10.36	4.65	26.13	3.97	12.79	24.65	.038												
Period Average		2.31	542,000	2,650			61	55	7.49	3.04	16.33	3.55	8.53	14.71													
Tons of Constituents, 1949											37,800	10,300	110,000	22,100	159,000												
Average Tons Period 1930-1949											47,900	11,800	120,000	34,600	132,000												
Sampling by U.S. Section																											
Rio Grande at Upper Presidio																											
Jan.	4	2.96	33,200	3,340	.35	7.8	64	57	8.32	3.76	21.72	3.33	11.35	19.22	.04												
Feb.	5	3.26	28,400	3,710	.42	7.9	65	58	8.64	4.26	24.17	2.82	12.69	21.80	.01												
Mar.	5	4.40	6,200	4,890	.55	7.9	62	61	13.01	5.93	31.47	2.67	17.10	30.80	.01												
Apr.	5	5.45	1,700	5,720	.56	7.6	54	61	20.32	7.58	33.07	2.62	21.43	37.60	.01												
May	3	1.99	2,980	2,140					7.8	50	8.39	10.74	10.84	8.59	.09												
June	1	.90	533	974					50	40	3.84	1.00	.94	4.96	.95												
July	1	.77	2,090	889					55	44	3.19	.68	4.65	3.42	.03												
Aug.	5	1.32	16,900	1,510					55	45	5.42	1.16	7.91	2.37	6.51												
Sept.	4	2.57	89,700	2,960	.32	7.8	61	56	8.73	2.75	17.96	3.17	9.73	16.52	.08												
Oct.	5	3.02	39,900	3,480	.58	8.0	64	58	8.78	3.75	22.32	3.05	11.77	20.51	.03												
Nov.	3	1.11	37,600	3,510	.44	7.8	65	57	8.35	4.10	22.98	3.08	12.05	20.35	.03												
Dec.	5	3.07	31,600	3,490	.42	7.9	65	57	8.35	3.97	22.75	3.20	12.01	20.14	.01												
Mean \bar{x}	4	2.64	286,803	3,010					7.83	63	56	8.14	3.14	18.85	2.97	10.32	17.00	.045									
Period Average	1.95	459,000	2,210					59	51	6.59	2.46	13.16	3.11	7.82	11.38												
Tons of Constituents, 1949											24,100	5,640	64,000	13,400	73,200	89,000											
Average Tons Period 1935-1949											42,200	9,560	96,700	30,300	120,000	129,000											
Sampling by Mexican Section																											
Río Conchos at Cuchillo Parado																											
Jan.	13	.90	32,700	941	.22	7.8	45	45	4.08	1.22	4.30	2.69	5.70	1.30	.05												
Feb.	10	.61	38,100	640	.16	7.9	40	11	3.05	.79	2.50	2.69	3.08	.75	.03												
Mar.	12	.61	50,400	640	.16	8.3	44	15	2.67	.78	2.69	2.40	3.02	.95	.04												
Apr.	10	.98	14,800	1,020	.24	8.0	55	21	3.53	1.24	5.52	2.20	5.92	2.12	.03												
May	10	1.01	18,000	1,040	.25	7.8	52	14	5.09	1.02	4.37	1.85	7.27	1.52	.03												
June	13	1.01	18,100	1,060	.26	7.8	52	17	3.93	1.25	5.32	2.21	6.61	1.80	.03												
July	17	.89	66,100	880	.13	7.6	58	28	8	5.70	.83	2.54	2.10	6.33	.70	.04											
Aug.	17	.89	66,100	843	.13	8.1	25	7	5.70	.77	2.13	2.05	6.16	.58	.04												
Sept.	15	.86	89,200	843	.10	8.1	29	7	5.59	.69	2.52	2.37	5.84	.62	.06												
Oct.	13	.69	53,800	698	.17	8.1	39	11	3.47	.81	2.74	2.75	3.47	.80	.04												
Nov.	13	.66	43,500	708	.16	8.2	14	12	3.30	.93	2.92	2.60	3.60	.85	.04												
Dec.	12	.76	43,200	823	.22	8.0	42	13	3.80	1.12	3.55	2.81	4.49	1.12	.04												
Mean \bar{x}	1.156	.788	528,300	801	.157	8.03	35	10	4.42	.86	2.87	2.41	4.96	.85	.052												
Period Average	.737	438,000	769					40	12	3.78	.88	3.08	4.33	.929													
Tons of Constituents, 1949											80,700	9,530	60,200	67,000	217,000	27,500											
Average Tons Period 1935-1949											61,200	8,720	57,300	65,200	168,000	26,600											
Sampling by U.S. Section																											
Río Conchos near Ojinaga																											
Jan.	5	.99	33,300	1,020	.25	7.8	15	16	4.43	1.37	4.84	3.00	6.04	1.70	.03												
Feb.	5	.63	34,500	688	.14	7.8	38	11	3.42	.82	2.62	2.97	3.24	.80	.03												
Mar.	5	.59	30,100	652	.13	8.0	44	14	2.83	.63	2.76	2.50	3.08	.90	.03												
Apr.	5	.96	14,400	1,080	.25	7.7	50	21	3.98	1.23	5.13	2.60	5.76	2.22	.01												
May	1	1.22	20,300	1,240	.24	7.9	49	16	6.40	1.25	5.18	2.55	8.36	2.08	.02												
June	4	.93	12,400	901	.21	7.8	49	19	3.90	1.05	4.74	2.07	5.75	1.90	.03												
July	7	.69	69,300	907		8.1	30	8	5.70	1.01	2.83	1.87	6.88	.72	.11												
Aug.	4	.64	83,500	661	.13	8.1	40	10	3.35	.60	2.62	2.39	3.55	.65	.06												
Sept.	5	.67	67,100	714	.12	8.1	33	11	4.11	.74	2.44	2.51	4.00	.80	.09												
Oct.	5	.67	53,800	737	.15	7.9	39	13	3.72	.82	2.89	2.97	3.63	.98	.04												
Nov.	2	.70	44,700	752	.15	8.0	39	12	3.78	.95	2.99	3.05	3.77	.90	.04												
Dec.	5	.83	36,000	850	.18	8.1	39	12	4.17	1.17	3.48	3.29	4.43	1.10	.04												
Mean \bar{x}	1.60	.744	505,900	774		8.00	39	12	3.96	.959	3.02	2.64	4.32	.950	.055												
Period Average	.595	584,000	638				58	14	3.28	.782	2.48	2.55	3.07	.900													
Tons of Constituents, 1949											73,400	9,660	64,300	74,500	192,000	31,200											
Average Tons Period 1935-1949											87,900	12,700	76,300	104,000	197,000	42,600											
Sampling by Mexican Section																											
Terlingua Creek																											
Jan.	3	1.55	232	1,340	.13	7.9	55	3	5.03	1.37	7.71	3.03	10.81	.40	.11												
Feb.	3	1.43	199	1,390	.20	7.9	54	5	5.40	1.41	7.87	3.13	11.50	.40	.09												
Mar.	3	1.43	184	1,410	.18	8.3	55	5	5.24	1.46	8.06	2.95	11.69	.40	.10												
Apr.	4	.88	606	901	.08	8.0	64	4	4.63	1.23	5.98	2.76	6.15	.53	.11												
May	2	1.49	304	1,530					52	.91	10.04	4.69	10.44	.55	.11												
June	5	1.26	2,360	1,240					8.1	55	4	4.82	1.10	6.79	.30												
July	5	.57	6,330	606					8.0	61	4	2.02	.30	5.68	.22												
Aug.	5	.74	6,290	710					50	3	3.15	.35	5.72	2.11	.07												
Sept.	5	1.26	9,570	1,210	.10	8.6	50	5	5.38	.35	6.35	3.60	8.76	.58	.07												
Oct.	4	.51	2,310	495					57	4	4.68	2.81	2.40</td														

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES—1949**

Month	No. of Sam- ples	Dissolved Solids			Mean EC x 10 ³ at 25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter					
		Tons Per Acre Foot	Total Tons	Mean EC x 10 ³ at 25°C						Ca	Mg	Na	CO ₃ + HCO ₃	SO ₄	Cl
Rio Grande at Johnson Ranch															
Jan.	7	1.40	61,000	1,580	.23	7.9	5.6	35	5.35	1.80	8.41	3.03	7.08	5.45	.08
Feb.	4	1.02	71,200	1.120	.19	7.9	5.0	29	4.28	1.28	5.50	3.13	4.89	3.35	.03
Mar.	3	.80	41,300	884	.16	8.1	4.6	23	3.76	.97	3.99	3.00	3.82	2.05	.03
Apr.	6	1.66	39,700	1,640	.21	7.7	4.9	12	7.37	1.28	8.44	2.60	12.85	2.10	.03
May	6	1.33	30,100	1,360	.21	7.9	39	17	7.22	1.30	5.52	2.25	9.63	2.40	.03
June	3	.88	40,800	901	.21	8.0	40	11	5.22	.77	3.92	2.53	6.38	1.13	.06
July	5	.79	67,400	801	.20	7.8	46	24	4.64	.68	3.49	2.25	5.67	1.01	.06
Aug.	5	.68	124,000	691	.10	7.9	36	11	3.87	.63	2.50	2.35	3.79	.80	.06
Sept.	5	.58	134,000	1,060	.20	7.8	46	24	4.71	.94	1.83	2.72	5.33	2.60	.08
Oct.	4	.97	104,000	1,080	.20	7.9	46	30	4.68	1.06	4.80	2.67	4.81	3.20	.04
Nov.	3	1.08	85,200	1,200	.19	8.1	50	32	4.54	1.40	6.03	3.07	5.01	3.88	.03
Dec.	4	1.15	68,300	1,300	.21	8.0	55	33	4.26	1.57	7.02	2.53	6.15	4.25	.04
Mean \bar{x}	52	.955	867,000	1,030		7.93	46	23	4.59	1.03	4.72	2.65	5.34	2.45	.050
Period Average		.973	644,000	1,050			47	23	4.51	1.10	4.88	2.65	5.50	2.47	
Tons of Constituents, 1949									114,000	15,500	134,000	99,800	317,000	107,000	
Average Tons Period 1948-1949									81,400	12,000	101,000	72,700	258,000	78,700	

Sampling by U.S. Section	Rio Grande at Langtry														
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean \bar{x}	Period Average	
Jan.	6	1.09	59,300	1,210	.20	8.0	50	31	4.16	1.86	6.03	2.85	5.58	3.72	.04
Feb.	5	1.03	81,200	1,160	.19	7.9	51	31	3.92	1.55	5.79	2.60	5.23	3.60	.05
Mar.	5	.75	53,200	830	.16	8.0	46	24	3.13	1.23	3.76	2.65	3.59	2.00	.03
Apr.	5	.50	30,600	561	.09	8.0	38	19	2.56	.83	2.04	2.35	2.09	1.05	.06
May	7	.78	37,800	849	.16	8.0	41	18	3.87	1.09	3.43	2.60	4.41	1.52	.09
June	8	.72	82,800	753	.14	7.9	35	12	4.03	.87	2.64	2.31	4.47	.92	.09
July	10	.89	91,700	914	.14	8.0	34	9	5.20	.99	3.26	2.60	6.10	.82	.09
Aug.	12	.65	161,000	675	.08	7.9	33	14	3.81	.69	2.80	2.20	3.66	.94	.06
Sept.	11	.67	135,000	758	.07	8.0	37	18	5.86	.65	2.70	2.37	3.65	1.30	.06
Oct.	10	.58	145,000	996	.18	8.0	45	27	4.37	1.12	4.41	2.95	4.32	2.65	.06
Nov.	6	.97	96,600	1,080	.19	8.2	46	30	4.18	1.43	5.24	2.97	4.62	3.22	.06
Dec.	4	1.06	82,400	1,150	.19	8.2	52	33	3.76	1.73	5.88	2.37	5.20	3.74	.09
Mean \bar{x}	89	.798	41,606,600	869		8.0	42	22	3.97	1.04	3.61	2.52	4.29	1.89	.065
Period Average		.806	892,000	792			45	24	3.65	1.15	3.99	2.53	4.23	2.12	
Tons of Constituents, 1949									143,000	22,800	149,000	138,000	371,000	121,000	
Average Tons Period 1948-1949									110,000	21,000	138,000	579,100	306,000	113,000	

Sampling by U.S. Section	Pecos River														
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean \bar{x}	Period Average	
Jan.	15	4.35	58,700	4,800	.27	7.8	61	63	10.17	9.08	29.86	2.21	16.01	31.22	.06
Feb.	14	4.20	55,600	4,650	.06	7.9	62	64	9.52	8.67	29.67	1.86	15.37	30.40	
Mar.	21	.48	35,900	4,760	.30	8.0	62	63	2.89	8.80	29.91	2.20	15.68	31.10	.04
Apr.	21	2.10	80,000	2,460	.16	8.0	59	60	5.77	4.11	14.14	2.10	7.61	14.45	.09
May	15	2.37	70,600	2,700	.16	8.0	58	59	4.68	4.68	15.31	2.30	8.17	15.80	.11
June	17	1.91	36,700	2,220	.11	8.0	57	58	5.40	3.94	12.29	2.45	6.76	12.65	.07
July	17	1.34	69,800	1,540	.21	7.8	53	54	1.63	2.61	8.09	2.67	4.43	8.19	.07
Aug.	18	.63	51,300	1,890	.08	7.9	58	59	5.57	3.31	10.84	1.77	5.83	11.03	.01
Sept.	15	1.94	39,200	2,320	.21	7.8	59	59	5.35	4.01	13.24	2.10	7.06	13.40	.09
Oct.	15	1.66	37,200	2,000	.18	8.0	57	58	1.71	3.71	10.91	2.05	5.92	11.26	.05
Nov.	15	2.62	45,000	2,970	.20	7.9	59	61	6.24	5.70	17.38	2.00	9.59	15.02	.10
Dec.	16	2.97	39,800	3,340	.20	7.9	59	61	7.46	6.43	20.16	2.41	10.96	20.67	.09
Mean \bar{x}	1,193	1.25	615,800	2,580		8.00	59	60	6.02	4.61	15.00	2.22	8.09	15.42	.076
Period Average		4,01	1,461,000	4,230			55	55	12.60	7.94	24.68	2.49	17.75	21.01	
Tons of Constituents, 1949									46,400	21,500	135,000	26,000	149,000	210,000	
Average Tons Period 1935-1949									125,000	47,800	281,000	37,600	422,000	139,000	

Sampling by U.S. Section	Goodenough Spring														
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean \bar{x}	Period Average	
Jan.	1	.39	2,690	466	.06	8.0	12	9	3.24	1.06	.61	3.77	.61	.42	.11
Feb.	1	.36	2,260	412	.06	8.0	13	9	2.64	1.08	.54	3.17	.64	.40	.19
Mar.	2	.37	3,420	420	.05	8.2	11	8	2.95	.85	.47	3.35	.56	.35	.16
Apr.	1	.34	3,180	455	.05	7.8	14	9	2.91	.97	.63	3.37	.61	.40	.11
May	2	.30	3,120	370	.07	7.9	11	9	2.58	.78	.42	3.00	.43	.35	.11
June	2	.36	3,290	431	.05	7.9	11	8	3.13	.90	.49	3.65	.47	.38	.09
July	2	.37	3,220	435	.04	8.1	10	8	3.16	1.00	.46	3.69	.48	.35	.11
Aug.	2	.35	2,950	430	.08	7.9	10	9	3.15	.92	.44	3.54	.47	.39	.10
Sept.	2	.31	2,590	334	.06	8.2	12	9	2.15	.93	.43	2.60	.47	.32	.10
Oct.	2	.32	2,680	399	.06	8.1	11	5	2.74	.96	.48	3.21	.48	.35	.11
Nov.	2	.34	2,620	403	.04	7.8	11	9	2.73	1.05	.48	3.23	.51	.38	.11
Dec.	2	.37	2,800	401	.05	8.1	13	10	2.59	1.12	.56	3.11	.55	.40	.11
Mean \bar{x}	21	.547	34,820	412		8.00	12	9	2.83	.96	.497	3.30	.518	.372	.116
Period Average		.515	35,200	377			11	10	2.57	.99	.536	2.87	.505	.392	
Tons of Constituents, 1949									7,750	1,590	1,560	13,700	3,400	1,800	
Average Tons Period 1948-1949									7,160	1,760	1,860	13,200	3,660	2,100	

Sampling by U.S. Section	San Felipe Creek														
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean \bar{x}	Period Average	
Jan.	4	.56	1,260	442	.06	8.0	10	12	.42	.75	.45	3.75	.34	.45	.16
Feb.	5	.53	2,650	391	.09	8.1	12	12	2.90	.56	.46	2.87	.33	.47	.20
Mar.	5	.42	2,050												

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES —1949**

Month	No. of Sam- ples	Dissolved Solids			Mean ECx10 ⁶ @25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter					
		Tons Per Acre Foot	Total Tons	Mean Total Tons						Ca	Mg	Na	CO ₃ + HCO ₃	SO ₄	Cl

Sampling by Mexican Section															
Rio Grande at Eagle Pass															
Jan.	26	1.06	121,000	1,230	.18	7.9	51	43	3.66	2.19	6.05	2.25	4.52	5.10	.08
Feb.	42	.58	231,000	670	.10	8.1	43	35	2.72	.93	2.72	2.00	2.14	2.50	.09
Mar.	86	.85	179,000	995	.12	7.9	43	36	3.96	1.55	4.11	2.90	3.26	3.52	.14
Apr.	82	.65	176,000	792	.11	7.7	42	37	3.15	1.25	3.21	2.35	2.34	2.85	.09
May	36	.63	176,000	754	.07	7.7	43	36	2.96	1.19	3.12	2.27	2.37	2.70	.09
June	30	.65	157,000	737	.11	7.8	43	31	2.96	1.12	3.03	2.10	2.80	2.20	.09
July	31	.58	140,000	663	.10	7.9	40	27	2.93	.93	2.57	2.25	2.31	1.75	.11
Aug.	30	.56	291,000	607	.11	8.0	33	20	3.30	.71	1.96	2.35	2.42	1.20	.13
Sept.	29	.64	222,000	747	.12	7.8	38	26	3.59	.88	2.74	2.51	2.88	1.92	.09
Oct.	31	.63	196,000	742	.15	8.0	41	30	3.17	1.08	2.98	2.47	2.54	2.18	.09
Nov.	30	.83	166,000	557	.15	8.1	47	36	3.52	1.51	4.38	2.55	3.42	3.35	.09
Dec.	21	.83	136,000	1,000	.12	8.0	50	39	3.08	1.77	4.76	2.23	3.64	3.76	.09
Mean θ	1474	.665	2,191,000	770		7.92	42	32	3.21	1.13	3.12	2.34	2.70	2.42	.101
Period Average	1.04	3,008,000	1,170				47	39	4.37	1.83	5.46	2.39	4.64	4.55	
Tons of Constituents, 1949									288,000	61,600	322,000	320,000	581,000	385,000	
Average Tons Period 1938-1949									346,000	87,700	196,000	288,000	880,000	638,000	

Rio Salado															
Sampling by Mexican Section															
Jan.	14	4.39	9,000	4,020	1.37	7.6	45	30	15.07	10.73	21.31	2.51	30.64	14.15	.14
Feb.	13	4.24	10,000	3,960	1.34	7.8	45	29	14.96	10.47	20.77	2.35	30.37	13.45	.12
Mar.	15	4.64	14,500	4,300	1.54	7.6	44	29	16.22	11.53	22.14	2.45	33.12	14.90	.16
Apr.	19	.52	43,000	592	.17	7.6	37	25	2.64	.90	2.07	1.40	2.94	1.32	.06
May	18	.80	58,300	895	.23	7.8	46	23	3.69	1.48	3.42	1.90	4.69	1.95	.08
June	13	1.16	11,600	1,260	.39	7.6	43	28	5.02	2.31	5.46	1.81	7.41	3.58	.06
July	14	1.94	29,400	1,910	.64	7.7	44	27	7.58	4.23	9.15	1.77	15.27	5.70	.09
Aug.	15	2.52	21,100	2,460	.87	7.7	42	25	10.02	5.87	11.58	1.92	18.45	6.92	.11
Sept.	15	1.36	19,400	1,400	.58	7.6	41	25	5.80	2.76	5.98	1.71	9.23	3.62	.09
Oct.	17	1.17	9,440	1,250	.39	7.7	41	23	5.00	2.51	5.25	2.00	7.52	3.16	.12
Nov.	11	.88	1,960	960	.51	7.8	39	23	4.06	1.74	5.77	1.90	5.48	2.20	.06
Dec.	15	2.54	5,280	2,460	.78	7.8	45	27	9.42	6.20	11.62	1.77	18.36	7.34	.10
Mean θ	1481	1.05	204,280	1,100	.331	7.67	41	25	4.50	2.17	4.66	1.68	6.77	2.89	.077
Period Average	.911	235,000	955			40	27	4.28	1.71	3.95	1.92	5.34	2.69		
Tons of Constituents, 1949									23,800	6,980	28,300	13,500	86,000	27,100	
Average Tons Period 1935-1949									30,100	7,310	31,900	20,500	90,000	33,500	

Rio Grande at Roma															
Sampling by Mexican Section															
Jan.	30	1.15	138,000	1,330	.22	7.8	49	41	4.11	2.43	6.32	2.50	5.15	5.40	.06
Feb.	28	.66	269,000	804	.78	4.6	35	29	2.93	1.28	3.56	2.13	2.86	2.76	.06
Mar.	30	.73	183,000	854	.14	8.0	46	36	2.99	1.37	3.72	2.00	3.04	3.15	.09
Apr.	29	.45	385,000	535	.13	7.9	46	30	2.07	.63	2.29	1.67	1.85	1.55	.06
May	29	.65	292,000	770	.09	7.8	41	35	3.19	1.06	2.99	2.27	2.53	2.60	.06
June	29	.62	219,000	728	.11	7.7	43	32	3.00	1.01	2.97	2.07	2.67	2.23	.07
July	31	.68	164,000	767	.13	7.9	42	33	3.12	1.19	3.10	2.37	2.67	2.50	.04
Aug.	31	.57	323,000	645	.11	8.0	31	21	3.43	.74	2.17	2.19	2.79	1.35	.06
Sept.	30	.63	244,000	753	.12	7.9	37	26	3.64	.92	2.68	2.30	3.12	1.95	.10
Oct.	31	.69	240,000	809	.15	7.7	42	31	3.46	1.07	3.30	2.47	2.95	2.45	.09
Nov.	29	.81	171,000	876	.18	8.0	44	33	3.50	1.28	3.76	2.63	3.06	2.86	.09
Dec.	31	.81	153,000	954	.15	8.0	47	37	3.27	1.65	4.38	2.27	3.50	3.42	.09
Mean θ	1358	.655	42,737,000	742		7.87	43	32	3.05	1.04	3.03	2.14	2.74	2.30	.070
Period Average	1.785	2,524,000	851			46	36	3.17	3.04	1.26	3.04	3.16	2.98		
Tons of Constituents, 1949									358,000	74,200	409,000	383,000	772,000	478,000	
Average Tons Period 1944-1949									285,000	69,000	396,000	298,000	682,000	474,000	

Rio Grande at Las Palmas															
Sampling by U.S. Section															
Jan.	28	1.24	113,000	1,430	.24	7.9	51	44	4.43	2.48	7.15	2.71	5.23	6.20	.08
Feb.	27	.95	214,000	1,180	.26	7.9	50	42	3.05	1.83	5.76	2.31	4.37	4.90	.09
Mar.	30	.65	174,000	779	.10	7.9	44	37	3.01	1.97	3.27	2.25	2.48	2.80	.11
Apr.															
May															
June															
July															
Aug.															
Sept.															
Oct.															
Nov.															
Dec.															
Mean θ	1,626	\$1,663,800	728			42	32	2.95	1.11	3.00	2.26	2.56	2.28	.069	
Period Average	1,694	1,671,000	806			46	34	3.06	1.18	3.56	2.21	2.95	2.67		
Tons of Constituents, 1948									214,000	48,800	250,000	249,000	445,000	292,000	
Average Tons Period 1946-1948									201,000	47,100	266,000	221,000	464,000	310,000	

North Foodway near Sebastian, Texas															
Sampling by U.S. Section															
Jan.	5	3.85	22,600	4,270	2.32	8.0	58	57	11.22	7.21	25.93	4.34	14.59	25.40	.10
Feb.	4	3.86	20,400	4,220	3.07	7.8	61	62	9.84	7.21	26.34	2.42	14.24	27.39	.05
Mar.	4	5.20	35,900	5,680	.69	7.8	57	55	13.26	9.72	35.53	3.27	19.20	36.93	.05
Apr.	7	1.29	28,400	1,570											
May	5	2.53	35,200	2,910	1.49	7.7	58	60	7.58	4.56	16.92	2.70	9.01	17.35	.04
June	4	3.29	12,700	3,740					</						

ELECTRICAL CONDUCTIVITY OF WATER SAMPLES

1949

| Date ECx10 ⁶
@25°C |
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El Paso

January	February	March	April	June	July	August	September	October	December
1 1,810	8 1,980	17 941	26 1,160	2 1,010	11 1,020	17 1,220	22 1,660	28 1,630	2 1,650
2 1,770	9 1,890	18 992	27 1,190	3 1,070	12 968	18 1,310	23 1,560	29 1,670	3 1,650
3 1,800	10 1,930	19 1,050	28 1,180	4 1,080	13 990	19 1,220	24 1,580	30 1,670	4 1,720
4 1,850	11 1,950	20 1,110	29 1,210	5 1,080	14 980	20 1,110	25 1,620	31 1,770	5 1,750
5 1,890	12 1,690	21 1,210	30 1,120	6 1,120	15 979	21 1,050	26 1,680	November	6 1,720
6 1,920	13 1,930	22 977	May	7 1,160	16 1,040	22 1,150	27 1,670	1 1,650	7 1,720
7 1,920	14 1,940	23 1,080	1 1,080	8 1,150	17 923	23 1,170	28 1,660	2 1,630	8 1,740
8 1,900	15 1,950	25 959	2 1,050	9 1,140	18 1,010	24 1,160	29 1,700	3 1,610	9 1,760
9 1,870	16 1,930	26 1,030	3 1,080	10 1,070	19 1,090	25 1,110	30 1,710	4 1,660	10 1,740
10 1,820	17 1,960	27 894	4 1,130	11 972	20 1,100	26 1,230	October	5 1,620	11 1,780
11 1,850	18 1,970	28 959	5 1,160	12 1,030	21 1,084	27 1,190	1 1,640	6 1,790	12 1,740
13 1,900	19 1,960	29 995	6 1,160	13 986	22 1,200	28 1,160	2 1,690	7 1,670	13 1,800
14 1,800	20 1,960	30 934	7 1,030	14 1,000	23 1,110	29 1,180	3 1,700	8 1,800	14 1,750
15 1,850	21 1,930	April	8 1,070	15 1,120	24 1,000	30 1,140	4 1,810	9 1,860	15 1,830
16 1,860	22 1,930	2 937	9 1,040	16 1,130	25 1,060	31 1,170	5 1,750	10 1,820	16 1,870
17 1,870	23 1,940	3 916	10 1,100	17 1,050	26 983	September	6 1,690	11 1,710	17 1,830
19 1,840	24 1,960	4 910	12 1,050	18 1,160	27 1,060	1 1,170	7 1,660	12 1,680	18 1,860
20 1,880	25 1,990	5 927	13 1,060	20 1,150	28 1,140	2 1,200	8 1,620	13 1,690	19 1,860
21 1,880	26 2,000	6 1,010	14 1,130	21 1,040	29 1,240	3 1,150	9 1,580	14 1,840	20 1,830
22 1,900	27 2,040	7 1,030	15 1,220	22 1,050	30 1,340	4 1,190	10 1,460	15 1,780	21 1,520
23 1,890	28 1,980	8 935	16 1,270	23 1,060	31 1,190	5 1,160	11 1,300	16 1,750	22 1,650
24 1,890	March	9 915	17 1,240	24 1,070	August	6 1,170	12 1,450	17 1,760	23 1,730
25 1,940	1 1,930	10 1,040	18 1,260	25 1,120	2 1,090	7 1,160	13 1,440	18 1,790	24 1,870
26 1,890	2 1,870	11 969	19 1,190	26 1,180	3 1,160	8 1,200	14 1,460	19 1,740	25 1,860
27 1,850	3 2,010	12 976	20 1,220	27 1,120	4 1,170	9 1,090	15 1,510	20 1,790	26 1,860
28 1,850	4 1,860	13 994	21 1,100	29 1,160	5 1,080	10 1,070	16 1,640	21 1,840	27 1,900
29 1,910	5 2,010	14 1,020	22 1,160	30 1,200	6 1,020	11 1,040	17 1,700	22 1,840	28 1,900
30 2,140	6 1,870	15 1,020	23 1,120	July	7 971	12 988	18 1,770	23 1,850	24 1,890
31 1,960	7 2,110	16 1,120	24 1,110	1 1,060	8 988	13 947	19 1,670	24 1,660	30 1,870
February	8 1,840	17 1,170	25 1,090	2 1,120	9 1,040	14 1,240	20 1,620	25 1,420	
1 1,770	9 1,250	18 1,126	26 1,110	3 1,000	10 1,050	15 1,040	21 1,690	26 1,510	
2 1,820	10 1,080	19 1,050	27 1,090	4 1,100	11 973	16 953	22 1,680	27 1,470	
3 1,950	11 1,090	20 1,140	29 1,090	5 1,070	12 1,080	17 1,060	23 1,650	28 1,470	
4 1,900	12 1,080	21 1,160	30 1,130	7 1,100	13 1,100	18 1,090	24 1,630	29 1,490	
5 1,890	13 1,030	22 1,120	31 1,070	8 1,110	14 1,080	19 1,240	25 1,680	30 1,710	
6 1,980	15 948	23 1,200	June	9 978	15 1,100	20 1,420	26 1,710	December	
7 1,840	16 952	25 1,190	1 1,160	10 974	16 1,160	21 1,470	27 1,710	1 1,700	

Fort Quitman

January	February	March	April	June	July	August	September	October	November	December
5 3,750	19 4,060	23 5,290	27 7,070	11 7,060	20 7,070	20 6,070	28 4,310	2 3,430	7 3,400	
12 3,730	24 4,010	30 5,820	May	15 6,700	22 5,350	31 6,070	October	8 3,370	14 3,520	
19 3,820	March	4 6,970	18 6,480	22 5,710	27 4,330	September	4 3,700	9 3,390	21 4,100	
26 3,560	1 4,400	6 5,990	18 6,480	30 6,380	August	3 5,920	5 4,050	16 3,540	28 3,590	
February	5 4,180	9 6,510	25 6,480	July	5 6,780	6 5,670	12 4,000	19 3,790	31 3,590	
2 3,540	9 4,650	13 5,990	31 5,910	6 7,530	6 6,820	14 2,860	19 3,720	23 3,650		
9 3,560	16 4,160	20 6,690	June	9 7,550	10 5,920	17 1,650	22 3,650	30 3,070		
16 3,980	19 4,290	26 5,840	1 5,440	13 5,720	17 4,950	21 2,660	26 3,230			

Upper Presidio

January	February	March	April	May	July	August	September	October	November	December
7 4,050	4 3,440	4 4,410	1 6,300	7 7,070	9 663	30 2,160	3 3,690	5 3,320	3 3,550	
14 2,690	11 5,660	11 4,720	8 6,260	14 1,700	August	10 4,170	10 3,780	12 3,450	10 3,510	
21 3,310	18 3,840	19 5,490	16 5,560	21 4,230	6 852	14 2,170	17 4,570	19 3,490	17 3,720	
31 3,480	25 4,170	25 5,590	23 3,680	June	13 655	17 3,110	24 2,980	26 3,780	24 3,710	
February	27 4,190	31 6,250	30 6,650	11 958	20 3,530	24 4,280	31 3,230	30 3,720	31 3,280	
17 1,000	28 579	6 1,076	20 1,060	29 978	25 798	26 821	23 766	31 741	7 730	
19 1,070	March	8 1,020	23 1,190	July	31 619	29 835	30 497	4 753	16 865	
21 1,060	2 615	11 1,120	25 1,140	1 1,100	August	31 929	October	7 718	19 833	
24 1,040	4 688	15 1,060	27 762	4 1,210	1 587	September	3 503	9 642	21 865	
26 992	7 639	18 1,100	30 1,090	6 1,130	3 632	5 971	5 567	11 643	23 885	
28 1,110	9 651	20 1,000	June	8 1,130	5 644	6 946	7 712	16 751	26 814	
31 876	11 621	22 1,140	1 1,020	11 1,150	7 1,660	7 1,080	10 1,020	13 697	19 712	
February	14 568	27 990	3 934	13 1,080	8 636	9 986	12 809	21 700	30 726	
2 963	18 571	May	6 1,050	15 1,020	10 532	12 663	14 722	23 796		
7 648	21 737	2 1,010	8 1,100	18 1,190	11 404	13 375	17 810	25 748		
9 657	23 634	4 1,080	10 1,110	20 930	12 1,180	14 1,990	19 768	28 850		

Río Conchos at Cuchillo Parado

January	February	March	May	June	July	August	September	October	November	December
1 1,030	11 623	25 773	6 1,040	15 1,100	22 844	15 582	15 1,110	21 637	30 788	
3 873	14 674	28 788	9 1,090	17 1,120	25 949	17 547	16 628	24 847	December	
5 926	16 629	30 937	11 997	20 1,140	25 1,100	19 656	19 660	26 792	2 766	
7 1,020	21 590	April	13 1,370	22 1,110	25 1,310	22 771	21 707	28 696	5 844	
10 1,080	25 642	1 924	16 1,280	24 1,170	25 798	24 821	23 766	31 741	7 730	
12 1,040	25 598	4 1,010	15 1,120	27 1,030	27 615	25 701	26 679	2 724	14 867	
17 1,000	28 579	6 1,076	20 1,060	29 978	29 493	26 867	28 541	2 724		
19 1,070	March	8 1,020	23 1,190	July	31 619	29 835	30 497	4 753	16 865	
21 1,060	2 615	11 1,120	25 1,140	1 1,100	August	31 929	October	7 718	19 833	
24 1,040	4 688	15 1,060	27 762	4 1,210	1 587	September	3 503	9 642	21 865	
26 992	7 639	18 1,100	30 1,090	6 1,130	3 632	5 971	5 567	11 643	23 885	
28 1,110	9 651	20 1,000	June	8 1,130	5 644	6 946	7 712	16 751	26 814	
31 876	11 621	22 1,140	1 1,020	11 1,150	7 1,660	7 1,080	10 1,020	13 697	19 712	
February	14 568	27 990	3 934	13 1,080	8 636	9 986	12 809	21 700	30 726	
2 963	18 571	May	6 1,050	15 1,020	10 532	12 663	14 722	23 796		
7 648	21 737	2 1,010	8 1,100	18 1,190	11 404	13 375	17 810	25 748		
9 657	23 634	4 1,080	10 1,110	20 930	12 1,180	14 1,990	19 768	28 850		

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Río Conchos at Ojinaga, Chihuahua

January	February	March	April	May	July	August	September	October	December
4 939	8 671	14 640	26 941	31 1,310	1 1,180	10 608	21 824	31 763	2 791
12 1,060	15 686	21 645	30 1,040	June	7 1,200	16 595	27 690	November	7 816
13 1,090	22 623	31 919	May	7 1,160	15 1,060	23 810	October	3 752	14 922
19 1,040	28 616	April	3 1,000	13 570	20 1,250	September	3 513	8 762	19 928
27 1,040	March	6 1,040	9 1,140	20 1,170	24 1,280	2 954	12 765	16 666	26 829
February	1 601	13 1,100	17 1,350	27 1,250	25 285	7 957	16 880	21 746	
1 881	7 627	20 1,120	25 1,150	31 626	14 634	24 765	25 849		

Mouth of Santa Helena Canyon

March	April	April	April	May					
14 768	11 1,300	19 1,380	26 1,280	2 1,280					

Terlingua Creek

January	February	March	April	June	July	August	September	October	November
3 1,410	12 1,420	22 1,410	26 811	6 1,400	1 795	1 1,100	5 1,380	3 1,400	14 1,360
12 1,420	22 1,420	April	May	16 1,180	8 448	9 439	12 763	11 1,400	21 1,390
27 1,250	March	3 1,430	2 1,500	21 1,200	12 1,040	15 871	19 1,480	18 1,400	December
February	2 1,420	11 1,440	24 1,490	24 1,400	19 1,390	22 1,170	23 936	25 411	2 1,400
2 1,390	14 1,360	19 1,420		27 1,380	28 605	31 1,380	29 1,340	November	12 1,420
								3 1,340	18 1,380

Johnson Ranch

January	February	March	April	May	July	August	September	October	November
1 1,560	1 1,470	12 903	20 1,370	31 1,370	4 723	5 666	4 1,010	2 829	13 1,120
5 1,270	11 1,150	21 793	25 2,030	June	20 1,000	9 584	11 1,030	9 1,530	23 1,180
8 1,270	15 1,070	April	27 1,290	13 1,040	22 1,160	13 628	20 1,030	17 1,230	December
11 1,490	21 878	2 1,110	May	20 1,010	27 748	20 911	24 1,090	23 917	1 1,360
15 1,780	March	4 1,180	3 1,240	28 1,470	31 753	30 846	28 1,090	November	9 1,170
21 1,770	1 895	10 1,280	23 1,460				2 1,270	17 1,580	27 1,270
24 1,660									

Mouth of Mariscal Canyon

Solis Ranch

Boquillas

April	April	May	April	May					
14 1,290	21 1,350	11 1,250	22 1,350	4 1,200					

Langtry

January	February	April	May	June	July	August	September	October	November
4 1,180	18 1,030	12 877	23 1,010	29 456	29 980	14 643	15 641	14 938	12 1,140
6 1,250	21 1,040	22 367	27 1,080	July	August	22 774	16 635	18 965	17 1,080
13 1,030	March	22 447	June	5 1,050	2 666	23 915	19 698	24 1,180	25 1,060
17 1,150	3 836	24 367	1 1,070	8 556	5 476	29 826	21 861	26 924	25 1,020
20 1,340	6 855	May	3 910	11 584	8 532	September	27 1,020	27 898	December
28 1,310	9 895	2 797	6 840	14 746	8 459	3 835	29 1,090	26 887	5 1,170
February	18 844	7 786	15 919	19 861	10 525	6 919	October	31 1,110	12 1,180
7 1,520	26 741	9 757	17 640	26 1,070	10 544	12 873	4 965	November	19 1,200
12 1,230	April	16 725	22 811	28 743	11 575	14 226	6 838	3 1,120	31 1,240
17 1,050	4 816	21 1,050	27 323	28 953	12 914	14 280	10 752	7 1,090	

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Pecos River near Comstock

January	February	March	April	May	July	August	September	October	November
2 4,500	9 5,540	19 3,920	21 1,920	24 3,420	1 1,440	7 3,010	10 2,660	20 2,670	25 3,100
4 4,700	11 5,360	21 3,970	22 571	26 4,090	3 2,690	8 3,450	10 2,850	22 2,880	27 3,140
6 4,760	13 5,220	23 3,760	23 2,760	28 3,440	5 2,670	8 2,140	14 2,320	24 1,100	29 3,160
8 4,320	15 5,240	25 3,980	24 1,170	30 1,920	7 2,760	9 485	16 707	24 891	December
10 5,000	17 5,130	29 4,200	25 1,180	June	9 3,010	11 1,090	18 3,900	26 1,070	1 3,150
12 4,950	19 4,860	31 4,460	26 3,210	1 2,570	11 2,950	13 1,950	20 2,520	28 2,470	3 3,090
14 4,650	21 4,040	April	29 2,140	3 2,650	13 3,020	15 2,140	22 1,840	30 2,960	5 3,090
16 4,950	23 5,060	2 4,540	30 916	5 2,510	15 3,170	17 2,350	24 2,270	November	7 3,130
18 4,860	25 2,020	4 4,660	May	7 2,570	17 2,300	19 2,750	26 2,360	1 2,980	9 3,130
20 4,790	25 3,440	6 4,540	2 3,060	9 775	19 2,390	21 2,270	28 2,350	3 3,090	11 3,100
22 4,790	27 3,190	8 4,440	4 3,580	11 551	21 2,850	23 2,630	30 2,320	5 3,240	13 3,310
24 4,900	March	10 4,610	6 2,620	13 2,020	23 2,970	25 2,610	October	7 3,160	15 3,370
26 4,700	1 3,530	12 4,220	8 1,440	15 1,180	25 2,970	27 2,710	2 2,520	9 2,970	17 3,360
28 5,150	3 5,460	14 4,820	10 2,660	15 3,370	26 2,92	29 3,150	4 2,510	11 2,770	19 3,460
30 5,320	5 7,630	16 4,890	12 2,000	17 2,360	28 5,510	31 2,700	6 2,470	13 2,820	21 3,590
February	7 7,040	18 4,820	14 1,840	19 5,100	30 3,060	September	8 2,660	15 2,840	23 3,560
1 5,420	11 4,570	19 4,350	16 1,920	21 3,310	August	2 2,640	10 2,560	17 2,940	25 3,880
3 5,660	13 4,410	19 4,950	18 1,930	23 2,880	1 2,280	4 2,720	14 3,000	19 2,890	27 3,750
5 5,660	15 4,030	22 2,090	20 2,330	25 3,200	3 2,370	6 2,680	16 2,990	21 2,940	29 3,740
7 5,360	17 4,030	21 2,180	22 5,510	26 2,590	5 2,840	8 2,860	18 2,770	23 3,080	31 3,800

Goodenough Spring

January	March	May	June	July	August	September	October	November	December
13 480	17 450	10 419	7 470	14 480	4 378	7	414	7 433	8 397
February	29 April	24 450	7 304	14 436	4 476	7 312	20 453	9 473	6 380
11 471	13 474		21 470	25 470	23 433	23 463	20 334	21 476	21 440

San Felipe Creek

January	February	March	April	May	June	July	August	October	November
5 495	2 437	2 468	6 519	2 537	2 509	8 418	12 484	3 476	22 484
12 486	9 473	10 493	13 528	9 395	10 517	11 443	19 431	11 437	December
19 487	10 464	16 519	19 450	16 534	14 477	20 463	September	21 380	2 372
26 493	16 485	23 517	25 502	23 499	23 451	4 495	6 324	November	13 455
	23 333	30 485	27 538	27 490	28 493	5 511	22 472	18 473	23 462

Eagle Pass

January	February	March	April	May	June	July	August	September	October	November
1 1,190	11 1,420	24 921	30 1,530	1 957	6 715	10 382	15 756	20 869	24 976	24 976
3 1,220	12 1,360	25 912	May	2 907	7 730	11 420	16 454	21 777	25 927	25 927
4 1,180	14 1,280	26 880	1 696	3 898	8 769	12 511	17 436	22 769	26 968	26 968
5 1,250	15 1,270	27 876	2 925	4 873	9 822	13 594	18 447	23 823	27 1,000	27 1,000
6 1,240	16 1,350	28 888	3 971	5 913	10 861	14 761	19 758	24 549	28 959	28 959
7 1,240	17 1,380	29 890	4 612	6 835	11 846	15 728	20 889	25 796	29 1,010	30 998
8 1,270	18 1,210	30 867	5 626	7 873	12 829	17 624	21 695	26 597	30 998	30 998
10 1,300	19 1,330	31 894	6 428	8 794	13 702	18 682	22 1,140	27 469	December	1,010
11 1,330	21 1,280	April	7 465	9 440	14 726	19 662	23 909	28 460	29 639	2 1,000
12 1,260	22 1,220	1 888	8 760	10 733	15 751	20 858	24 829	29 868	30 868	3 995
13 1,270	23 406	2 810	9 1,020	11 2,120	16 709	21 782	25 806	30 868	3 995	3 995
14 1,310	25 470	3 925	10 1,040	12 441	17 773	22 851	26 857	31 863	5 1,030	5 1,030
15 1,320	26 291	4 928	11 898	13 421	18 876	23 877	27 891	November	7 927	7 927
17 1,250	27 536	5 929	12 783	14 582	19 961	24 780	28 842	1 840	9 1,060	9 1,060
18 1,250	28 866	8 1,030	13 839	15 615	20 767	25 823	29 884	2 861	10 1,050	10 1,050
19 1,220	March	9 1,060	14 841	16 621	21 674	26 760	30 879	3 898	12 1,060	12 1,060
20 1,220	1 834	10 957	15 840	17 778	22 686	27 695	October	4 933	13 956	13 956
21 1,250	2 914	11 988	16 786	18 821	23 667	28 790	1 873	5 1,080	15 985	15 985
22 1,260	3 845	12 975	17 832	19 862	24 722	29 782	2 830	6 929	17 1,030	17 1,030
24 1,280	4 882	13 955	18 723	20 877	25 693	30 1,000	3 837	7 1,080	20 994	20 994
25 1,320	5 1,070	18 978	19 737	21 813	26 843	31 837	4 786	8 1,110	21 1,010	21 1,010
26 1,350	6 1,120	15 954	20 846	22 874	27 737	September	5 842	9 1,110	22 1,040	22 1,040
27 1,360	7 1,110	16 986	21 614	23 916	28 373	1 707	6 819	10 1,050	23 1,000	23 1,000
28 1,330	8 1,140	17 990	22 589	24 1,180	29 565	2 885	7 904	11 1,050	24 1,060	24 1,060
29 1,350	9 1,160	18 1,010	23 667	25 1,240	30 964	3 873	8 900	12 1,060	26 1,160	26 1,160
31 1,440	10 1,190	19 964	24 851	26 1,200	31 1,410	4 878	9 700	13 1,020	28 1,070	28 1,070
February	12 1,180	20 555	25 1,040	27 907	August	5 735	10 586	14 924	29 1,060	29 1,060
1 1,400	14 1,070	21 602	26 1,100	28 431	1 898	6 772	11 687	15 982	30 1,100	30 1,100
2 1,420	16 944	22 1,060	27 1,200	29 551	2 940	7 737	12 776	16 962	31 1,050	31 1,050
3 1,290	17 981	23 1,000	28 1,100	30 666	3 1,100	9 790	13 773	17 969		
4 1,330	18 960	24 668	29 884	July	4 805	10 787	14 786	18 1,020		
5 1,330	19 905	25 435	30 1,040	1 812	5 796	11 791	15 753	19 1,010		
7 1,440	20 940	26 513	31 1,140	2 645	6 786	12 797	16 776	20 950		
8 1,470	21 949	27 747	7 619	3 730	8 769	13 769	17 840	21 995		
9 1,500	22 925	28 614	4 696	5 686	9 350	14 825	18 908	22 990		
10 1,390	23 911	29 920					19 859	23 941		

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Laredo

March	March	March	March	March	March	April	April	April	April	April	April	April	April	May
3 861	10 1,000	17 1,160	24 953	31 902	6 917	13 982	20 726	27 450	1 652					
4 873	11 1,030	18 1,090	25 919	April 1	7 920	14 1,000	21 837	28 474	2 897					
5 851	12 1,100	19 1,020	26 922	1 906	8 917	15 987	22 647	29 604	3 1,450					
6 911	13 1,160	20 997	27 912	2 900	9 932	16 1,020	23 682	30 564						
7 914	14 1,180	21 991	28 917	3 881	10 956	17 1,010	24 621							
8 851	15 1,220	22 971	29 983	4 822	11 976	18 1,020	25 1,040							
9 940	16 1,160	23 955	30 916	5 892	12 1,020	19 1,010	26 473							

Rio Salado

January	February	March	April	May	June	July	August	September	October	November
1 3,320	9 4,240	21 4,850	25 368	25 706	30 2,880	3 2,820	9 1,440	15 2,030	28 1,500	
3 3,410	11 4,320	23 4,740	26 942	27 760	July 5	2,110	12 1,830	17 1,310	30 1,650	
5 3,520	14 4,430	25 4,590	27 585	30 829	1 2,850	8 2,660	15 1,750	19 738		December
7 3,620	16 4,510	28 4,520	30 434	31 859	4 2,540	10 1,600	19 2,190	21 607	1 1,660	
10 3,740	18 4,590	30 4,570	May	June 6	1,260	10 1,980	21 1,080	24 562	2 1,780	
12 3,800	21 4,650	31 4,630	1 468	1 878	8 1,040	13 3,020	22 1,660	26 508	5 2,520	
14 3,900	23 4,630	April 2	498	3 935	11 322	15 1,900	23 1,340	28 511	7 2,970	
17 4,120	25 4,610	4 3,810	4 522	6 993	13 322	17 2,570	26 2,450	29 477	9 3,150	
19 4,240	28 3,230	4 3,510	6 527	8 1,022	15 367	19 2,660	28 1,640	31 501	12 2,980	
21 4,310	March 6	3,150	9 679	10 1,108	18 2,620	22 2,830	30 1,010	November 14	2,810	
24 4,390	1 3,830	9 3,700	11 3,120	11 1,140	20 1,890	24 2,970	October 1	545	2,650	
26 4,390	2 3,660	11 3,860	11 4,410	13 2,600	22 2,460	26 3,030	1 1,040	2 782	19 2,530	
28 4,440	4 4,170	13 3,980	11 515	15 1,240	25 2,390	29 3,150	3 1,050	4 876	21 1,960	
31 4,440	7 3,850	15 4,210	12 711	17 725	27 2,340	31 3,080	5 953	7 988	23 1,820	
February 9 4,130	18 4,170	13 539	20 1,560	29 1,310	September 7 988	14 960	26 1,790			
1 4,410	11 4,390	20 4,080	16 369	22 2,330	31 1,480	1 2,960	10 1,130	16 985	28 1,810	
2 4,370	14 4,590	22 2,630	18 463	24 2,500	August 2 943	12 1,150	21 1,100	30 3,180	31 2,180	
4 4,320	16 4,670	23 386	20 565	27 2,680	1 2,200	5 721	14 766	23 1,180	31 2,400	
7 4,210	18 4,740	24 330	23 633	29 2,880	7 1,240	14 990	25 1,250			

Roma

January	February	March	April	May	July	August	September	October	November	
1 1,310	7 1,380	15 1,050	22 609	30 659	5 635	10 648	15 805	21 794	27 993	
2 1,320	8 1,450	16 1,150	23 430	31 702	6 946	11 386	16 799	22 772	28 987	
3 1,330	9 1,460	17 1,200	24 477	June 7	613	12 512	17 785	23 706	29 976	
4 1,310	10 1,460	18 1,214	25 372	1 699	8 732	13 596	18 756	24 745	30 975	
5 1,290	11 1,460	19 1,250	26 420	2 838	9 764	14 668	19 631	25 837	December	
6 1,310	12 1,480	20 1,240	27 458	3 968	10 788	15 482	20 517	26 910	1 956	
7 1,300	13 1,470	21 1,180	28 420	4 974	11 794	16 537	21 808	27 658	2 969	
8 1,310	14 1,470	22 1,130	29 502	5 1,100	12 647	17 654	22 566	28 616	3 973	
9 1,300	15 1,500	23 1,100	30 641	6 1,080	13 738	18 578	23 741	29 1,000	4 855	
10 1,280	16 1,560	24 1,040	May 7	1,120	14 707	19 904	24 812	30 519	5 749	
11 1,290	17 1,620	25 1,020	1 694	8 1,050	15 699	20 715	25 844	31 500	6 678	
12 1,290	18 1,600	26 1,030	3 751	10 936	16 588	21 651	26 687	November 7	633	
13 1,320	19 1,570	27 972	4 827	11 383	17 589	22 677	27 814	1 465	8 925	
14 1,310	20 1,560	28 1,050	5 994	12 544	18 666	23 682	28 1,120	2 480	9 994	
15 1,300	21 1,540	29 1,030	6 1,450	13 575	19 916	24 685	29 919	3 454	10 989	
16 1,310	22 1,500	31 981	7 836	14 508	20 940	25 685	30 881	4 536	11 1,000	
17 1,330	23 1,460	April 8	672	15 683	21 1,060	26 703	October 5	661	12 988	
18 1,350	24 1,410	2 988	9 549	16 845	22 773	27 742	1 840	6 803	13 1,050	
19 1,370	25 782	3 1,030	10 488	17 556	23 908	28 785	2 834	7 826	14 998	
20 1,370	26 465	4 1,110	11 823	18 584	24 862	29 881	3 882	8 839	15 1,000	
21 1,400	27 412	5 992	12 787	19 671	25 808	30 867	4 827	9 840	16 1,060	
22 1,390	28 329	6 1,000	13 648	20 663	26 856	31 836	5 869	10 897	17 1,060	
23 1,380	March 7	974	14 693	21 728	27 874	September 6 933	11 910	18 1,020		
24 1,370	1 404	8 924	16 882	22 674	28 864	1 840	7 935	13 981	19 1,010	
25 1,410	2 307	9 806	17 1,060	23 627	29 916	2 569	8 895	14 988	20 987	
26 1,400	3 490	10 931	18 1,110	24 719	30 481	3 905	9 993	15 1,040	21 1,010	
27 1,420	4 568	11 1,000	19 873	25 797	31 412	4 803	10 804	16 1,070	22 1,050	
28 1,360	5 744	12 1,010	20 855	26 842	August 5 752	11 887	17 1,050	23 1,070		
29 1,350	6 898	13 941	21 931	27 798	1 433	6 761	12 900	18 1,030	24 1,080	
31 1,340	7 926	14 998	22 964	28 704	2 553	7 781	13 888	19 1,030	25 1,070	
February 8 918	15 1,010	23 933	29 742	3 659	8 749	14 895	20 1,010	26 1,080		
1 1,270	9 912	16 1,020	24 851	30 845	4 880	9 662	15 734	21 980	27 1,090	
2 1,280	10 907	17 1,020	25 860	July 5 1,410	10 789	16 716	22 966	28 1,060		
3 1,320	11 875	18 1,040	26 843	1 1,090	6 955	11 845	17 813	23 978	29 1,060	
4 1,330	12 921	19 1,050	27 884	2 1,050	7 841	12 827	18 802	24 978	30 1,030	
5 1,360	13 953	20 1,100	28 891	3 807	8 1,040	13 818	19 787	25 1,010	31 1,050	
6 1,500	14 1,030	21 1,080	29 726	4 856	9 764	14 798	20 788	26 995		

ELECTRICAL CONDUCTIVITY OF WATER SAMPLES

1949

Date	ECx10 ⁶ @25°C												
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Las Palmas

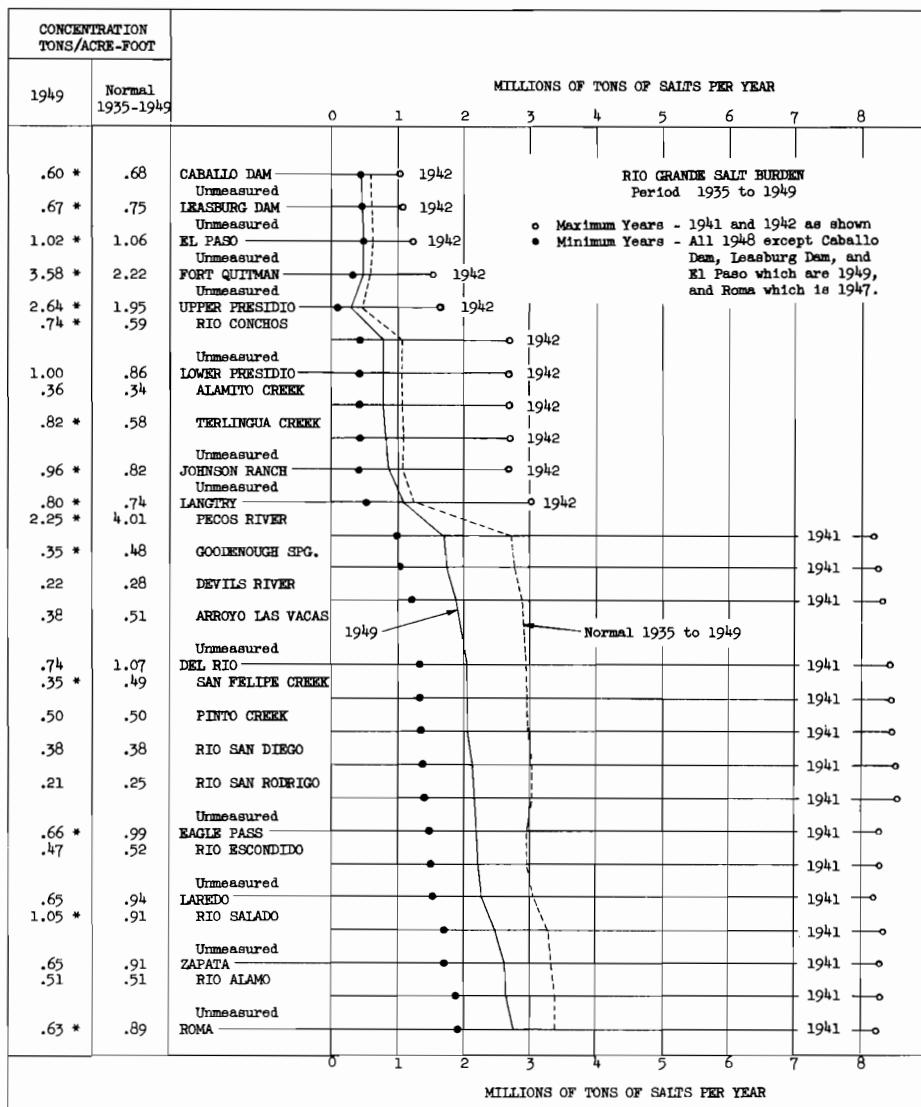
January	February	March	April	May	July	August	September	October	November	
1 1,460	9 1,520	18 1,060	24 596	30 1,030	4 968	9 1,240	14 875	21 1,090	26 1,140	
2 1,590	10 1,510	19 1,170	25 599	31 1,070	5 1,170	10 1,040	15 1,020	22 950	27 1,150	
3 1,410	11 1,550	20 1,220	26 525	June		6 1,340	11 846	16 1,040	23 939	
4 1,450	12 1,530	21 1,290	27 466	1 968	7 1,330	12 739	17 1,040	24 989	28 1,150	
5 1,480	13 1,530	22 1,300	28 470	2 1,010	8 1,070	13 1,90	18 1,050	25 969	30 1,200	
6 1,460	14 1,530	23 1,330	29 519	3 1,050	9 954	14 594	19 1,030	26 912	December	
7 1,470	15 1,580	24 1,370	30 504	4 901	10 1,110	15 593	20 842	27 792	1 1,170	
8 1,500	16 1,550	25 1,330	May		5 977	11 1,050	16 603	21 813	28 877	
9 1,530	17 1,540	26 1,330	1 559	6 923	12 927	17 499	22 523	29 1,030	3 1,170	
10 1,540	18 1,560	27 1,270	2 551	7 912	13 1,010	18 174	23 661	30 832	4 1,160	
11 1,430	19 1,540	28 1,210	3 743	8 1,140	14 974	19 581	24 773	31 915	5 1,170	
12 1,420	20 1,550	29 1,150	4 600	9 1,150	15 1,040	20 650	25 787	November		
13 1,430	21 1,550	30 1,150	5 700	10 1,270	16 1,010	21 625	26 783	1 802	7 998	
14 1,450	22 1,560	April		7 714	11 1,320	17 1,180	22 760	27 872	2 682	
15 1,450	23 1,560	1 1,180	7 789	11 713	18 1,190	23 914	28 867	3 642	9 999	
16 1,410	24 1,600	2 1,170	8 959	12 712	19 989	24 805	29 878	4 616	10 831	
17 1,480	26 1,580	3 1,200	9 989	13 508	20 889	25 746	30 792	5 603	11 899	
20 1,390	27 951	4 1,180	10 879	14 544	21 821	26 768	October	6 621	12 896	
21 1,410	28 597	5 1,070	11 835	15 636	22 818	27 762	2 1,190	7 622	13 1,150	
22 1,440	March		6 1,180	12 774	16 634	23 1,110	28 757	3 1,010	8 652	
23 1,520	1 470	7 1,200	13 623	17 683	24 1,220	29 765	4 987	9 778	15 1,180	
24 1,500	2 403	8 1,330	14 540	18 673	25 1,220	30 745	5 1,020	10 891	16 1,180	
25 1,470	3 482	9 1,310	15 694	19 1,030	26 1,230	31 778	6 941	11 989	17 1,140	
26 1,480	4 500	10 1,240	16 695	20 1,060	21 1,360	September	7 1,020	12 985	18 1,140	
27 1,550	5 497	11 1,150	17 696	21 684	26 1,380	1 872	8 976	13 1,040	19 1,170	
28 1,510	6 495	12 1,120	18 702	22 700	29 1,250	2 971	9 1,010	14 1,040	20 1,190	
29 1,500	7 595	13 1,200	19 705	23 874	30 1,340	3 996	10 1,020	15 1,070	21 2,210	
31 1,510	8 677	14 1,200	20 841	25 878	31 884	4 808	11 1,020	16 1,090	22 2,250	
February		9 762	15 1,220	21 977	26 938	August	5 823	12 1,060	17 1,170	23 1,250
1 1,490	10 887	16 1,210	22 997	27 985	1 662	6 635	13 1,050	18 1,160	24 2,210	
2 1,420	11 997	17 1,220	23 1,020	28 948	2 594	7 837	14 925	19 1,190	25 1,190	
3 1,380	12 1,030	18 1,240	24 921	29 978	3 482	8 956	15 969	20 1,210	26 2,210	
4 1,410	13 1,020	19 1,180	25 973	30 983	4 482	9 889	16 1,020	21 1,230	27 1,250	
5 1,380	14 1,050	20 1,240	26 1,040	July		5 517	10 914	17 995	22 1,210	28 1,260
6 1,340	15 1,060	21 1,280	27 1,050	1 981	6 676	11 969	18 985	23 1,200	29 1,270	
7 1,390	16 1,050	22 1,350	28 1,030	2 1,070	7 1,040	12 966	19 850	24 1,180	30 1,250	
8 1,470	17 982	23 1,320	29 1,050	3 933	8 1,040	13 993	20 802	25 1,170	31 1,250	

North Floodway near Sebastian, Texas

January	February	March	April	May	July	August	September	October	December
3 3,840	18 4,960	28 5,260	26 768	31 4,620	7 3,050	15 2,610	19 2,300	24 2,610	5 3,070
10 4,230	21 4,180	April		30 824	June	11 2,950	22 2,150	26 1,840	31 3,010
17 4,720	28 2,990	4 4,260	May		6 5,080	18 3,300	29 2,100	October	19 3,560
24 4,320	March		11 5,310	2 1,880	13 3,530	25 3,600	September	3 3,530	20 3,260
31 4,390	7 6,370	18 4,660	9 3,590	20 3,730	August	6 2,930	10 2,700	14 3,160	21 3,240
February	14 6,370	20 4,400	16 5,650	27 3,150	8 3,150	12 2,470	17 2,140	21 3,160	28 2,920
7 5,330	21 6,060	25 864	23 5,120	8 2,570					

RIO GRANDE SALT BURDEN

The term "salt" as used herein means total dissolved solids. The concentrations, in tons per acre-foot, for 1949, which are marked by an asterisk (*) are based on the chemical analyses shown on preceding pages of this bulletin. Those not asterisked are based either on chemical analyses reported in previous Water Bulletins, or have been arrived at by deduction. The normal concentrations shown for the period 1935 to 1949 are the weighted means of the values determined for the 15-year period indicated.



SANITARY ASPECTS OF WATER QUALITY

The United States and Mexican sections of this Commission, and the Texas State Department of Health co-operate in the joint sanitary water-sampling program along the Rio Grande with some co-operation from the United States Public Health Service. All analyses below have been made under the "Rules of Laboratory Procedure" as approved by the participating agencies, and which conform with the procedures set out in the manual, "Standard Methods for the Examination of Water and Sewage" - Ninth Edition (1946), prepared by the American Public Health Association and the American Water Works Association. These analyses were made in the laboratories of the El Paso Water Plant, the Laredo Water Plant, the Cameron County Health Unit, and the International Boundary and Water Commission. Analyses for Biochemical Oxygen Demand (B.O.D.) and for Dissolved Oxygen (D.O.) were made for only a part of the samples.

The percentages of Dissolved Oxygen (D.O.) shown below are the percent saturation at the elevation of the sampling station. Similar values published in previous issues of this bulletin are expressed as the percent saturation at sea-level elevation.

Date 1949	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)	Date 1949	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)
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FRANKLIN CANAL AT EL PASO WATER PLANT

Feb. 8	94.1	2.1	2,300	4,500	July 5	92.0	1.6	3,600	1,500
15	126	1.9	1,600	2,000	12	93.6	1.6	3,600	1,800
23	125	2.5	1,100	4,200	19	91.9	1.7	24,000	5,000
Mar. 1	103	1.9	2,300	8,600	26	92.9	1.4	11,000	8,900
8	3.0	1,100	3,500	Aug. 2	99.8	1.5	11,000	3,600	
15	98.2	2.8	2,300	5,000	9	101	1.7	11,000	6,800
22	108	3.5	3,600	2,300	16	103	1.6	11,000	4,000
29	95.2	2.1	3,600	2,600	23	98.3	1.6	16,000	3,800
Apr. 5	104		24,000	2,400	30	99.2	1.9	2,300	5,500
12		1.45		1,500	Sept. 6		1.7	38,000	6,500
19		2.4	6,200	1,400	13	86.5	2.0	70,000	
26		2.0	2,300	1,000	20	97.9	1.2		425
May* 3		.8	11,000		27	100	2.4	6,200	13,800
10		2.0	9,400	4,000	Oct. 4	94.0	1.0	3,600	16,400
17		2.0	2,300	3,000	11	108	1.4	11,000	1,400
24	94.6	1.9	6,200		18	109	2.8	9,400	4,500
31	98.8	1.4	11,000		25	109	1.5	11,000	1,400
June 7	104	1.5	1,300		Nov. 1	107	1.5	3,600	2,500
14	87.2	4.4	2,300						
21	103	2.1	3,600	3,000					
28	96.0	1.85	6,200						
					Total	3,120.2	73.7	350,000	136,825
					Average	100.7	1.94	9,460	4,280

RIO GRANDE AT YSLETA-ZARAGOZA BRIDGE

Jan. 4	78.9	11.6	2,400,000	50,000	July 19	74.1	8.0	360,000	260,000
11	78.2	3.3	1,100,000	150,000	26	75.6	10.7	1,100,000	230,000
18	88.4	11.2	28,000	180,000	Aug. 2	82.8	3.6	1,600,000	150,000
25	58.9	9.5	2,800,000	400,000	9	87.2	4.6	620,000	170,000
Feb. 1	59.0	11.2	360,000	490,000	16	85.8	3.8	360,000	300,000
8	73.6	9.4	230,000	160,000	23	82.8	4.8	1,600,000	460,000
15	67.3	12.5	1,600,000	550,000	30	86.9	6.1	62,000	120,000
23	79.0	10.5	160,000	150,000	Sept. 6	74.2	6.35	240,000	400,000
Mar. 1	68.0	5.2	360,000	260,000	13	71.4	4.1	1,100,000	320,000
8	67.7	7.7	94,000	400,000	20	71.3	6.4	1,600,000	925,000
15		6.0	230,000	300,000	27	95.1	7.8	600,000	200,000
22	72.6	13.8	360,000	200,000	Oct. 4	69.8	5.75	16,000	90,000
29	73.1	3.0	620,000	200,000	11	76.8	5.0	110,000	160,000
Apr. 5	97.6	2.8	360,000	30,000	18	70.3	7.4	360,000	880,000
12	88.0	14.0	620,000	480,000	25	75.6	4.6	210,000	120,000
19	83.1	9.0	2,400,000	140,000	Nov. 1	80.7	5.5	360,000	
26	72.8	8.0	230,000	240,000	8	69.3	6.2	1,600,000	260,000
May 3	66.2	5.6	940,000		15	68.0	7.2	93,000	790,000
10	83.4	6.0	550,000	240,000	22	80.5	8.5	62,000	170,000
17	91.2	10.0	230,000	120,000	29	82.0	10.0	93,000	220,000
24	74.1	10.3	360,000		Dec. 6	71.4	8.6	36,000	230,000
31	78.2	12.3	620,000		13	76.5	8.0	1,100,000	270,000
June 7	79.6	13.6	230,000		20	65.8	6.4	620,000	260,000
14	98.0	1.3	230,000		27	76.4	8.3	360,000	
21	82.7	5.1	3,800,000	80,000					
28	71.2	4.9	230,000						
July 5	79.8	4.8	360,000	140,000	Total	3,939.2	388.4	36,124,000	12,045,000
12	78.3	8.1	360,000	100,000	Average	77.2	7.5	694,700	275,800

SANITARY ASPECTS OF WATER QUALITY

Date	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)	Date	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)	Date	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)	Date	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)
1949			1949			1949			1949		

RIO GRANDE AT LAREDO WATER PLANT

Jan.	4	2,400		Apr.	26	140,000		Aug.	15	6,200	62,000	Oct.	28	11,000	29,500
	7	230			29	2,300			16	6,200	73,000	Nov.	1	6,200	40,500
11	360		May	3	1,100			19	6,200	56,000		4	6,200	45,000	
14	1,100			6	3,600			22	3,600	47,000		7	2,300	9,050	
18	620			10	7,000			23	3,600	20,500		8	6,200	10,000	
21	230			13	2,400			26	1,300	10,500		11	2,200	4,800	
25	360			17	360			29	1,100	7,000		14	1,100	3,200	
28	93			20	2,400			30	1,100	7,500		15	2,400	6,400	
Feb.	1	360		24	940		Sept.	2	38,000	25,000		18	230	850	
	4	230		27	230			6	620	4,800		21	110	1,390	
8	2,400		June	31	360			6	3,600	3,150		22	360	900	
11	2,400			3	36			9	230	1,000		25	620	1,100	
15	360			7	110			12	2,300	2,250		29	110	1,500	
18	2,400			10	140,000			13	2,400	1,100		29	340	1,950	
22	110			14	2,300			16	2,300	11,500	Dec.	2	14,000	7,200	
25	70,000			17	70,000			19	620	67,500		5	1,100	3,500	
Mar.	1	70,000		21	3,600			20	38,000	79,000		6	2,400	2,400	
	4	1,100		24	620			23	11,000	40,500		9	2,400	4,000	
8	1,100			26	7,000			26	9,300	45,000		13	940	375	
11	2,400		July	1	2,300			27	11,000	70,000		16	620	950	
15	1,100			5	2,400			30	3,600	13,000		19	110	650	
18	1,100			8	110			Oct.	3	3,600	12,000		20	95	550
22	360			10	7,000			4	5,800	8,900		23	620	500	
25	360			15	360			7	3,600	11,200		27	360	700	
29	80			19	2,400			10	1,600	25,000		27	160	750	
Apr.	1	250		22	940			11	3,600	12,000		30	110	600	
	5	2,400		26	360			14	11,000	43,500					
8	620			29	3,600			17	1,100	3,500					
12	250		Aug.	2	11,000			18	620	3,900					
15	1,100			5	11,000			21	160	850					
19	620			9	24,000			24		18,900	Total	1,021,864	984,765		
22	70,000			12	16,000			25	11,000	19,800	Average	8,450	16,980		

RIO GRANDE 9.1 MILES BELOW LAREDO R.R. BRIDGE

Jan.	4	11,000		Apr.	19	16,000		July	11	24,000		Oct.	4	240,000	24,000
	11	70,000		May	3	9,400			19	140,000			17	5,400	31,500
	18	38,000			10	5,500			26	6,200			24		31,000
Feb.	8	6,200			17	70,000		Aug.	2	24,000		Nov.	7	36,000	20,500
	15	9,400			24	930			9	11,000	16,200		14	16,000	23,000
Mar.	8	9,400			31	330			15	11,000	77,000		21	94,000	14,500
	15	6,200		June	7	16,000			22	16,000	63,500	Dec.	5	110,000	16,000
	22	16,000			14	24,000			29	21,000	23,000		19	23,000	25,000
	29	6,200			21	11,000		Sept.	6	110,000	110,000	Total		1,626,160	695,200
Apr.	5	24,000			28	16,000			20	240,000	145,000	Average		40,650	46,350
	12	28,000		July	5	11,000			27	94,000	75,000				

RIO GRANDE AT FALCON, TEXAS

Aug.	8	70,000	7,160	Sept. 19	21,000	86,000	Nov.	7	11,000	39,000	Dec.	17	6,200	30,000
	15	5,400	47,500		26	21,000		14	16,000	12,500		27	2,300	4,500
	22	5,400	75,000	Oct. 4	4	11,000		21	3,600	4,000				
	29	6,200	13,500		10	36,000		29	9,300	12,500				
	Sept. 6	2,300	20,000		17	6,200		Dec. 5	11,000	95,400		Total	235,600	602,560
	12	1,600	4,000		24	17,500					Average	13,090	31,710	

RIO GRANDE AT CHAPENO

Sept. 19	11,000	39,000	Oct. 17	23,000	59,000	Nov. 21	2,300	7,000	Dec. 27	260	1,000
26		57,500	24		27,000	29	6,200	9,500			
Oct. 4	11,000	36,000	Nov. 7	62,000	69,000	Dec. 5	62,000	12,700	Total	247,460	407,200
10	6,200	20,000	14	55,000	58,000	19	6,200	11,500	Average	20,620	31,320

RIO GRANDE AT MERCEDES PUMPS

Jan.	3	360		Apr.	11	170		July	18	2,300		Oct.	24	620	
	10	210			18	2,400			25	210			31	930	
	17	360			25	22,000		Aug.	1	9,400			Nov.	7	11,000
	24	210		May	2	11,000			8	3,600			14	6,200	
	31	360			9	3,600			15	3,600			21	3,600	
Feb.	7	230			16	9,400			22	3,600			28	360	
	14	230			23	1,600			29	3,600			Dec.	5	620
	21	230			31	62		Sept.	6	3,600			12	2,300	
Mar.	1	28,000		June	6	130			12	210			19	620	
	7	16,000			13	13,000			19	6,200					
	14	2,300			20	3,600			26	5,500					
	21	360			27	620		Oct.	3	3,600					
	28	2,100		July	5	3,400			10	3,600					
Apr.	4	1,600			11	160			17	1,100			Total		200,062
													Average		3,920

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED
IN INCHES—1949

The daily rainfall records tabulated below have not been published elsewhere. For each station there is indicated the source of the record and the type of rain gage in use. The general location of each station is shown on the map of the watershed, pages 43 and 47 of this bulletin.

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	Total Inches	Normal or Average
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Recording gage																										I. B. & W. C.					
Jan.	.04	.01	.22						.09	.11	.03	.11	.02	.06					.10	.01	.01	.38	.34						1.76	.56	
Feb.																													.29	.36	
Mar.																														.04	.36
Apr.																														.03	.29
May																														.99	.33
June																														.68	.38
July																															
Aug.																															
Sept.																															
Oct.																															
Nov.																															
Dec.																															

Period 1939-1949 Total 1949 7.02

Recording gage																										I. B. & W. C.					
Jan.	.05	T	.14						.04	.01	.01	.11	.18	.03	.12														1.28	.41	
Feb.																														.30	.29
Mar.																														0	.31
Apr.																														.17	.18
May																														.20	.18
June																														.60	.49
July																															
Aug.																															
Sept.																															
Oct.																															
Nov.																															
Dec.																															

Period 1939-1949 Total 1949 8.06 7.41

Standard gage																										I. B. & W. C.					
Jan.	.05	.10							.05		.13	.12	.16	.04	.05													1.69	.51		
Feb.											.12																		.29	.22	
Mar.																														0	.34
Apr.																														.03	.29
May																														.35	.26
June																														.65	.56
July																															
Aug.																															
Sept.																															
Oct.																															
Nov.																															
Dec.																															

Period April 1940-1949 Total 1949 8.03 8.46

Recording gage																										I. B. & W. C.					
Jan.	.02	.02	.13						.04		.05	.15	.05	.14														1.29	.53		
Feb.																														.22	.22
Mar.																														0	.34
Apr.																														.03	.29
May																														.35	.33
June																														.55	.64
July																															
Aug.																															
Sept.																															
Oct.																															
Nov.																															
Dec.																															

Period September 1941-1949 Total 1949 7.27 8.32

Standard gage																										I. B. & W. C.					
Jan.	.04	.02	.39						.05		.07	.17	.03						.02	.06							1.17	.47			
Feb.																														.29	.32
Mar.																														0	.21
Apr.																														.12	.14
May																														.09	.11
June																														.29	.35
July																															
Aug.																															
Sept.																															
Oct.																															
Nov.																															
Dec.																															

Period May 1940-1949 Total 1949 9.00 11.36

Standard gage																									C. H. Chandler		
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**RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED
INCHES—1949**

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 or Average			
Recording gauge																													T. B. & M. C.							
Jan.	.02	.03	.15					.05	.03		.07	.24	.02																							
Feb.											.02	.16	.00																							
Mar.											.00																									
Apr.											.00	.11	.19																							
May											.00	.17																								
June											.02																									
July																																				
Aug.																																				
Sept.																																				
Oct.																																				
Nov.																																				
Dec.																																				
# Period May 1940-1949 Total 1949																																	7.10	9.08		
Recording gauge																																T. B. & M. C.				
Jan.	.02	.03	.15					.05	.03		.07	.24	.02																							
Feb.											.02	.16	.00																							
Mar.											.00																									
Apr.											.00	.11	.19																							
May											.00	.17																								
June											.02																									
July																																				
Aug.																																				
Sept.																																				
Oct.																																				
Nov.																																				
Dec.																																				
# Period May 1940-1949 Total 1949																																	7.10	9.08		
Recording gauge																																T. B. & M. C.				
Jan.	.10							.07			.05																									
Feb.																																				
Mar.																																				
Apr.																																				
May																																				
June																																				
July																																				
Aug.																																				
Sept.																																				
Oct.																																				
Nov.																																				
Dec.																																				
# Period May 1940-1949 Total 1949																																	7.10	9.08		
Recording gauge																																T. B. & M. C.				
Jan.	.10							.07			.05																									
Feb.																																				
Mar.																																				
Apr.																																				
May																																				
June																																				
July																																				
Aug.																																				
Sept.																																				
Oct.																																				
Nov.																																				
Dec.																																				
# Period May 1940-1949 Total 1949																																7.10	9.08			
Recording gauge																																T. B. & M. C.				
Jan.	.10							.07			.05																									
Feb.																																				
Mar.																																				
Apr.																																				
May																																				
June					</td																															

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED
INCHES - 1949

Period 1946-1949

Standard gauge		Comstock, Texas												George Bushrangers					
Jan.	Feb.								.10		.14		.83		.10		.16	.99	
Mar.	Apr.												.38		.10		.67	1.11	
May	June												1.05	1.27	.18	.28	2.61	1.10	
July	Aug.												.13		.06		.40	.87	
Sept.	Oct.												.57	1.04			3.96	1.80	
Nov.	Dec.															.23	3.46	1.35	
																	2.33	2.83	1.09
																	6.11	6.11	1.09
																	3.41	2.10	1.10
																	2.65	2.65	1.09
																	0	0	0
																	.57	.57	.57
																	2.79	2.79	1.10
																	1.36	1.36	1.36
																	Period May 1939-1940	Total 1945	33.56
																	15.50	Total	15.50

Period May 1939-1949 Total 1949 33.56 18.30

Period July 1941-1949 Total 1949 28.00 20.19

Period May 1939-1949 Total 1949 29.65 16.11

iod March 1948-1949 Total 1949 28.47

November 1941-1949 Total 1949 31.74 20.33

Period June 1941-1949 Total 1949 25.38 18.78

Period 1930-1949 Total 1949 19.32 18.41

1

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES -1949

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 Inches	Normal Average
Laredo, Texas, International Bridge																												U. S. Weather Bureau					
Standard gage																																	
Jan.	.07	.15	.12																														
Feb.	.29	.08																															
Mar.																																	
Apr.																																	
May																																	
June																																	
July																																	
Aug.																																	
Sept.																																	
Oct.																																	
Nov.																																	
Dec.																																	
	1.41	.02																															
Period 1941-1949																														Total 1940-1949	17.66		

AVERAGE RAINFALL ON SUBDIVISIONS OF THE RIO GRANDE WATERSHED

IN INCHES -1949

Watershed/Subdivision	Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
El Paso to Fort Quitman	1949	1.75	.27	.01	.06	.66	.63	.187	.156	.29	.114	.60	.91	10.24
	Total	37.63	29.85	27.40	25.23	32.81	64.81	187.59	156.29	114.60	74.83	37.04	51.82	400.00
	Normal	.18	.38	.35	.30	.41	.83	2.37	1.98	1.49	.94	.47	.66	10.63

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES -1949

The daily rainfall records tabulated below have not been published elsewhere. For each station there is indicated the source of the record and the type of rain gage in use. The general location of each station is shown on the map of the watershed, pages 46 and 47 of this bulletin.

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 Inches	Normal or Average
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Standard gauge		Guerrero, Chih.												Meteoric. Sess. of Mex.					
Jan.	.05				.04	.22		.15	.32	.69	.79	.45		.16					
Feb.		T	.03										T		.37				.28
Mar.														.02					.00
Apr.																			.21
May																			.54
June																			.01
																			.27
July																			.00
Aug.																			.57
Sept.																			.00
Oct.																			.57
Nov.																			.00
Dec.																			.57
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* Some months missing

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES-1949

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 Inches	Average Inches
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Some monthly winners

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES-1949

Allende, Coah. 1947													Hydraulic Resources		
Standard gauge	.17	.12	.06	.06	.06	.10	.28	.16	.06	.12	.71	.80	.20	.54	
Jan.														.00	
Feb.														.00	
Mar.														.76	
Apr.															1.26
May															2.03
June															1.61
July															
Aug.															
Sept.															
Oct.															
Nov.															
Dec.															
															Total 1947 17.04

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES-1949

Some months missing

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

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 Inches	Normal or Average
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RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES -1949

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1949

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 Inches	Normal Average
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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	Standard gage		Las Enramadas, N. L.		Hydraulic Resources	
Jan.	.26																																	.63	1.12		
Feb.	.08																																	.67	.66		
Mar.																																		.61	.61		
Apr.																																		.70*	1.60		
May																																		1.22	3.54		
June																																		1.22	3.50		
July																																					
Aug.	.59																																				
Sept.	.63																																				
Oct.																																					
Nov.																																					
Dec.																																					

Period 1926-1949 Total 1949 19.94 25.73

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	Standard gage		El Cuchillo, N. L.		Hydraulic Resources	
Jan.	.10	.06	.04	.01	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	T	.01	.01	
Feb.	.01																																				
Mar.	.01																																				
Apr.	.09																																				
May																																					
June																																					
July																																					
Aug.																																					
Sept.																																					
Oct.																																					
Nov.																																					
Dec.																																					

Period June 1935-1949 Total 1949 26.54 20.53

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	Standard gage		Gral. Bravo, N. L.		Hydraulic Resources	
Jan.	.18																																				
Feb.	.11	T	.01	.06	.04	.01																															
Mar.																																					
Apr.																																					
May																																					
June																																					
July																																					
Aug.	.59																																				
Sept.	.39																																				
Oct.																																					
Nov.																																					
Dec.																																					

Period 1926-1949 Total 1949 18.99 21.00

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	Recording gage		Cerralvo, N. L.		Hydraulic Resources	
T	.01	.05	.17																																		

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RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES-1949

4 Some months missing

**EVAPORATION IN THE RIO GRANDE BASIN
IN INCHES**

Two general types of land pans are being used for observing evaporation in the Rio Grande Basin below San Marcial, New Mexico.

1. Standard "Class A" pan of the Weather Bureau - Circular pan 4 feet in diameter and 10 inches deep, made of 22-gage galvanized iron, set on wooden platform with top of pan 18 inches above ground. Water in pan kept 7 to 9 inches deep. Measurements by micrometer hook gage. This type of pan is used at Jornada, Elephant Butte Dam, Caballo Dam, State College, Ysleta, Balmorhea (Weather Bureau), Grandfalls, Fort Stockton, Del Rio, Dilley, and Laredo for all of which the Weather Bureau furnished the records. This type of pan is maintained by the U.S. Section of the International Boundary and Water Commission at Dryden, Texas, where the water in the pan is kept between 7 and 8 inches deep. At Mexican stations the pans are of this type; however, the pan at La Boquilla is made of copper, set upon concrete pillars, with the water kept 5 to 8 inches deep, and the pan at Palestina is set on a platform 3 feet above the ground, with the water kept 4 to 9 inches deep. The records for Mexican stations are furnished by the Meteorological Service of Mexico, the Ministry of Hydraulic Resources, and Cía. Agrícola y de Fuerza Eléctrica del Río Conchos, S.A.

2. Standard B.P.I. pan - Circular pan 6 feet in diameter and 24 inches deep, made of 22-gage galvanized iron, set in ground with top of pan 4 inches above ground. Water in pan kept 16 to 18 inches deep. Measurements by micrometer hook gage. This type of pan is used at Balmorhea (A. & M. College).

A variation of this type is used at Weslaco where the pan is 8 feet in diameter, set with the top about 9 inches above ground and with the water kept 12 to 18 inches deep.

The exposure of the water in these pans to wind is very different with respect to the rim of the pan and also with respect to surroundings. For example, the pan at Elephant Butte Dam is on top of a desert hill, while the pan at Weslaco is in an irrigated orchard with large trees within about 30 feet of the pan. The area around the pan at Dryden is flat and bare for more than 100 feet on all sides, whereas the pan at Palestina has mesquite brush on three sides just outside a fence of horizontally spaced boards.

In The United States

Month	Elephant Butte Dam, N. M.		Caballo Dam N. M.		Jornada, N. M.		State College, N. M.		Ysleta, Texas	
	1949	Normal 1933-49	1949	#Average 1942-49	1949	#Normal 1938-49	1949	Normal 1924-49	1949	#Normal 1939-49
Jan.	2.15	3.13		3.19	1.43	2.43	2.02	2.93		2.95
Feb.	4.96	5.09	4.89	5.28	2.64	4.04	4.21	4.46		4.62
Mar.	9.47	8.80	9.38	8.92	6.64	7.25	8.67	7.64		8.52
Apr.	10.53	12.18	10.23	12.16	7.16	10.11	9.70	9.85		9.35
May	16.05	15.28	14.96	15.56	10.94	12.87	13.43	11.87		13.37
June	15.28	16.92	14.03	16.60	11.37	14.15	13.09	12.95		14.61
July	14.25	14.44	13.20	13.87	8.59	12.30	11.53	11.80		12.36
Aug.	14.01	12.80	12.77	12.24	8.75	10.54	10.12	10.24		10.60
Sept.	9.61	10.04	9.44	10.18	6.09	8.41	8.40	8.29		8.60
Oct.	8.82	7.94	8.38	7.45	4.81	5.91	6.43	6.18		6.26
Nov.	5.89	5.08	5.27	5.01	2.78	3.59	4.24	3.95		4.43
Dec.	3.65	3.32	3.32	3.10	1.61	2.26	2.49	2.65		2.98
Total	114.67	115.02		113.56	72.86	93.86	94.33	92.81		98.91

Month	Dryden, Texas		Balmorhea, Texas Weather Bureau		Balmorhea, Texas Texas A. & M.		Grandfalls, Texas	
	1949	#Average 1944-49	1949	#Average 1940-49	1949	#Normal 1926-49	1949	#Average 1940-49
Jan.	2.06	3.60	1.44	2.31	1.12	2.25	1.78	3.17
Feb.		5.75	3.20	3.66	2.52	3.18	4.52	4.98
Mar.	9.28	10.12	7.20	6.42	4.99	5.14	9.61	8.74
Apr.	10.19	12.49	6.32	8.06	5.01	6.33	8.10	11.62
May	11.75	13.74	9.84	9.43	7.91	7.54		13.10
June	15.03	15.95	10.75	10.10	8.27	8.16		13.99
July	15.18	15.79	9.41	9.87	7.43	7.88		13.65
Aug.	11.20	15.18	7.98	9.03	6.48	7.11		12.78
Sept.	11.01	11.42	5.88	6.71	4.65	5.39	7.83	9.07
Oct.	6.28	6.83	5.43	5.10	4.23	4.16	6.44	6.95
Nov.	6.10	5.57	4.42	3.48	3.73	2.93	5.21	4.59
Dec.	4.32	4.32	2.95	2.51	2.60	2.09		3.00
Total		120.76	74.82	76.68	58.94	62.16		105.64

Some months missing

EVAPORATION IN THE RIO GRANDE BASIN IN INCHES

In The United States

Month	Fort Stockton, Texas		Del Rio, Texas		Dilley, Texas		Laredo, Texas		Weslaco, Texas	
	1949	#Average 1940-49	1949	Average 1946-49	1949	#Normal 1928-49	1949	#Average 1946-49	1949	Normal 1932-49
Jan.	2.14	3.13	2.06	2.63	2.26	2.76	3.11	3.43	2.41	2.30
Feb.	5.03	4.89	3.41	4.22	3.34	3.44	4.48	4.93	1.72	2.73
Mar.	9.47	8.80	5.88	7.41	4.98	6.03	7.34	8.63	3.43	4.21
Apr.	7.79	10.52	5.18	8.52	5.00	7.35	7.36	10.71	3.71	5.13
May	11.60	12.44	8.53	9.55	6.96	8.14	11.00	11.03	5.56	5.82
June	14.71	13.68	10.59	10.89	7.80	9.59	13.98	13.85	6.68	6.55
July	13.05	13.20	10.66	11.79	10.26	10.70	14.84	15.84	7.18	6.97
Aug.	10.21	11.59	8.79	11.56		10.65	14.98	13.96	6.73	6.70
Sept.	8.50	9.16	8.11	8.58		7.64	11.09	10.08	12.40	5.20
Oct.	6.55	6.64	4.82	5.96		5.83	7.01	7.64	4.37	4.41
Nov.	5.87	4.74	4.19	4.36		3.64	6.02	5.98	3.61	3.35
Dec.	4.52	3.82	2.24	2.99		2.65	2.93	3.69	2.48	2.43
Total	99.44	102.61	74.46	88.26		78.42	104.14	109.57	60.28	55.80

In Mexico

Month	San Antonio, Durango		La Junta, Chih.		Villalba, Chih.		La Boquilla Dam, Chih.		Las Virgenes, Chih.	
	1949	Average 1943-49	1949	Normal 1936-49	1949	Average 1940-49	1949	Normal 1938-49	1949	
Jan.	5.64	4.67	2.49	2.67	5.17	5.15	3.83	4.06	3.16	
Feb.	6.35	6.79	3.46	3.80	7.20	7.32	6.57	5.98	4.20	
Mar.	9.95	10.36	7.13	6.42	11.81	11.63	11.14	9.73	8.33	
Apr.	9.87	11.02	7.91	8.95	10.81	13.41	11.50	11.63	9.92	
May	12.24	12.09	10.82	10.86	13.42	15.30	15.15	13.95	12.69	
June	10.78	10.90	9.58	10.29	13.65	14.30	14.87	13.73	14.63	
July	9.31	8.34	6.48	7.27	9.36	11.10	9.87	11.15	10.10	
Aug.	7.59	7.89	6.26	6.21	9.44	9.66	10.25	9.62	9.78	
Sept.	6.02	6.17	5.03	5.34	6.91	7.56	7.84	7.50	7.78	
Oct.	5.61	5.61	4.18	4.73	6.68	6.88	7.42	6.44	5.94	
Nov.	4.54	4.98	3.51	3.36	5.59	5.66	5.55	4.84	3.42	
Dec.	5.16	4.16	2.35	2.46	5.35	4.61	4.00	3.66	3.01	
Total	93.06	92.98	69.20	72.36	105.39	112.58	107.99	102.29	92.96	

Month	Delicias, Chih.		Palestina, Coah.		Piedras Negras, Coah. 39 Dr. Coss Street					
	1949	Average 1940-49	1949	Normal 1931-49	1943	1944	1945	1946	1947	Average 1943-47
Jan.	2.46	3.52	4.98	5.56		3.66	5.01	4.86	4.13	4.42
Feb.	5.25	5.30	3.40	4.88		4.54	4.76	6.59	6.33	5.56
Mar.	8.33	8.66	5.68	7.18		6.49	7.13	10.71	8.11	
Apr.	9.55	9.91	6.41	8.39		9.98	9.31	10.82		10.04
May	11.93	11.75	5.96	9.38		10.23	12.99	10.05		11.09
June	12.00	11.92	8.10	10.64		13.05	15.06	13.57		13.89
July	9.36	10.39	10.23	11.32		12.34	16.10	18.05		15.50
Aug.	8.83	8.75	9.31	11.34		13.93	15.28	17.83		15.68
Sept.	6.62	7.41	8.60	9.30	6.31	8.45	13.77	11.96		10.12
Oct.	5.82	5.94	8.78	8.10	5.22	7.28	7.51	8.94		7.24
Nov.	4.02	4.32	7.93	6.72	3.54	4.80	7.03	6.85		5.56
Dec.	2.83	3.39	4.61	5.64	2.66	3.88	5.98	5.43		4.49
Total	87.00	91.26	84.05	98.45		98.63	119.93	125.66		111.70

Some months missing ♦ Station moved to new location May 23, 1949

**EVAPORATION IN THE RIO GRANDE BASIN
IN INCHES**

In Mexico

Month	Piedras Negras, Coah. 23 Juárez Street				Sabinas, Coah.		Villa Juárez, Coah.		Don Martín, Coah.	
	1947	1948	1949	Average 1947-49	1949	Average 1941-49	1949		1949	Normal 1927-49
Jan.	2.20					2.91	2.17		2.35	3.45
Feb.	2.06					3.58	2.70		3.23	4.20
Mar.	6.27					6.68	6.17		4.88	7.23
Apr.						10.00	5.54		5.10	8.87
May	7.17					10.46	8.31		7.07	10.27
June	8.07					12.09	11.19		9.08	11.75
July	9.07					11.84	11.16		11.06	12.33
Aug.	7.58					11.85	10.40		10.10	11.91
Sept.	6.61					8.34	8.78		7.71	8.31
Oct.	4.74					7.22	6.04		5.58	6.23
Nov.	2.20					4.14	3.79		3.78	4.22
Dec.	1.96					2.19	2.36		1.91	3.20
Total						89.47	78.47		71.85	91.97

Month	Lag. De Salinillas, N. L.		Cd. Anahuac, N. L.		Monterrey, N. L.				Montemorelos, N. L.	
	1949	Normal 1936-49	1949	Normal 1935-49	1944	1945	1949	Normal 1921-49	1949	Average 1941-49
Jan.	2.35	3.72	2.49	2.56		3.28	2.17	3.88	2.00	2.57
Feb.	2.90	4.83	3.01	3.46		6.44	3.73	4.87	3.26	3.07
Mar.	5.22	8.02	5.80	6.21		7.84	5.42	6.69	4.65	5.52
Apr.	4.48	9.75	5.51	7.75		10.61	5.39	7.71	3.88	5.72
May	7.02	10.49	8.02	8.84		10.70	6.52	8.52	4.92	6.33
June	7.70	11.12	9.26	10.19		12.37	8.09	9.41	7.08	7.58
July	9.01	11.90	9.81	11.02		11.10	9.44	10.23	8.94	8.85
Aug.	8.06	11.04	10.03	10.73	9.79	10.31	9.40	9.37	8.97	8.57
Sept.	6.71	8.09	7.84	7.19		5.82	8.33	6.78	5.76	5.60
Oct.	4.44	6.27	5.18	5.34		5.95	4.61	4.87	4.76	3.81
Nov.	3.75	4.75	4.63	3.21		2.94	4.22	2.59	3.80	4.05
Dec.	2.02	3.50	3.07	2.48	2.75	4.52	2.71	3.45	1.92	2.38
Total	63.66	93.48	74.65	79.28		94.33	70.11	78.45	60.25	62.83

Month	El Cuchillo, N. L.		Saltillo, Coah.		Los Herreras, N. L.		Ciénaga De Flores, N. L.		Comales, Tamps.		Control (C-I-K-9), Tamps.	
	1949	Average 1940-49	1949	Normal 1929-49	1949	Average 1941-49	1949	Average 1941-49	1949	Normal 1938-49	1949	Average 1942-49
Jan.	3.53	4.04	4.90	3.31	3.63	3.60	3.83	3.55	4.03	3.21	2.90	
Feb.	5.06	5.18	5.36	4.32	4.47	3.39	4.42	4.44	5.56		3.05	
Mar.	6.99	8.48	7.22	7.82	7.30	7.76	5.81	7.03	6.44		8.70	5.06
Apr.	6.93	9.65	8.16	9.28	6.52	8.59	6.51	7.87	7.76		10.72	6.74
May	9.72	10.78	8.98	9.37	8.95	9.28	7.19	8.77	11.37		12.03	7.52
June	11.89	12.06	7.10	9.71	11.01	9.93	9.31	9.44	12.76		13.78	7.63
July	12.98	14.01	9.76	8.84	12.37	11.67	9.49	10.28	15.21		15.30	8.49
Aug.	11.94	13.07	8.91	8.41	12.32	11.23	9.24	9.84	13.95		13.92	8.33
Sept.	10.57	9.21	6.49	6.64	9.06	7.55	8.06	6.93	10.13		9.84	6.38
Oct.	8.58	6.76	5.27	5.99	7.75	5.88	6.34	5.07	8.84		7.89	5.69
Nov.	5.61	5.02	5.32	5.03	5.61	4.58	4.83	4.47	6.76		5.81	4.24
Dec.	3.60	4.32	4.29	5.21	3.47	4.06	4.42	3.32	4.57		4.41	3.48
Total	97.40	102.58		86.56	91.99	88.63	78.19	81.27	105.78		111.99	69.51

TEMPERATURE, HUMIDITY, AND WIND AT DRYDEN EVAPORATION STATION

The temperature and humidity at Dryden Evaporation Station are recorded continuously by a hygrothermographic instrument housed in a low-louvered insulated shelter at the level of and about 6 feet from the evaporation pan. The total miles of wind movement are indicated by a standard 3-cup anemometer, installed and operated according to specifications for a Class A Weather Bureau evaporation station. The hygrothermograph and anemometer, furnished by the U.S. Weather Bureau, began operating in June 1947. The mean temperature and humidities below are integrated from the continuous record.

Month	Mean Temperature Degrees Fahrenheit		Mean Relative Humidity Percent		Mean Wind Miles per Hour	
	1949	Average July 1947-1949	1949	Average July 1947-1949	1949	Average July 1947-1949
January	39.1	41.2	57.8	54.0	5.4	5.2
February						
March	59.2	59.2	37.6	38.1	5.9	6.1
April	62.9	68.4	47.1	44.2	5.8	6.0
May	75.6	76.6	51.2	48.9	6.5	6.6
June	79.3	81.9	47.0	42.4	6.2	5.8
July	81.6	82.8	43.2	45.2	4.8	5.4
August	79.2	81.0	51.4	49.4	3.4	4.6
September	76.6	76.5	59.5	49.8	3.9	3.8
October	66.1	68.6	63.4	56.9	3.6	3.9
November	59.2	56.1	49.4	46.5	3.3	3.9
December	50.0	50.4	63.1	55.5	3.5	3.7

DRAINAGE BASIN AND IRRIGATED AREAS
Along the Rio Grande and Tributaries—1949

The total area within the outer rim of the Rio Grande Basin is about 335,500 square miles; however, in many places, particularly along the southwestern boundary of the basin, large areas contribute no surface run-off to the Rio Grande. Such non-contributive areas constitute about 48.8% of the total area, leaving 171,887 square miles of productive watershed. Only the productive part of the watershed is included in the list below.

The irrigated areas shown below are listed according to the downstream sequence of the points of diversion of their irrigation water and consequently, they may or may not be wholly within the indicated main river or tributary reach. They are all within the Rio Grande Basin except in the Lower Rio Grande Valley below the Rio Grande City gaging station where water is diverted at numerous points to irrigate lands which are adjacent to, but do not contribute surface run-off to the Rio Grande. All of the areas listed are equipped with irrigation facilities. In the United States all areas were irrigated in 1949; in Mexico the areas classed as "Secondary" are those for which water is available only after the water requirements of the "Primary" areas have been satisfied.

DESIGNATIONS OF AREAS AND GAGING STATIONS	Drainage Basin—Square Miles			Irrigated Areas—Acres		
	In		Total	In		Total
	United States	Mexico		United States	Mexico	
Above San Marcial Gaging Station	24,717	0	24,717	726,000	0	726,000
San Marcial Station to El Paso Station	4,550	0	4,550	103,978	0	103,978
Above El Paso Gaging Station	29,267	0	29,267	829,978	0	829,978
El Paso Station to American Dam	4	0	4	0	0	0
Above American Dam	29,271	0	29,271	829,978	0	829,978
American Dam to Juárez Station	41	47	88			
Above Juárez Gaging Station	29,312	47	29,359			
Juárez Station to Island Station	146	472	618			
Above Island Gaging Station	29,458	519	29,977			
Island Station to County Line Station	185	186	671			
American Dam to County Line Station -total	672	705	1,377	56,911		
Above County Line Gaging Station	29,943	705	30,648	886,889		
County Line Station to Ft. Quitman Station	663	679	1,342	18,370		
Above Fort Quitman Gaging Station	30,606	1,384	31,990	905,259	44,479	949,738

DRAINAGE BASIN AND IRRIGATED AREAS

Along the Rio Grande and Tributaries—1949

DESIGNATIONS OF AREAS AND GAGING STATIONS	Drainage Basin—Square Miles			Irrigated Areas—Acres			Total	
	In		Total	In		Total		
	United States	Mexico		United States	Mexico			
Fort Quitman Station to La Nutria	1,041	886	1,927	2,284	6,424		8,708	
Above La Nutria Gaging Station (Inactive)	31,647	2,270	33,917	907,543	50,903		958,446	
La Nutria to Upper Presidio Station	580	503	1,083	2,143	9,143		11,286	
Above Upper Presidio Gaging Station	32,227	2,773	35,000	909,686	60,046		969,732	
Rio Conchos above Boquilla Dam	0	7,522	7,522	0	2,965	0	2,965	
Rio Conchos below Boquilla Dam	0	17,419	17,419	0	188,540	12,108	200,648	
Rio Conchos - total	0	24,741	24,741	0	191,505	12,108	203,613	
Upper to Lower Presidio Station - excluding Rio Conchos	21	5	26	*	822	0	822	
Upper to Lower Presidio Station - total	21	24,746	24,767	822	191,505	12,108	204,435	
Above Lower Presidio Gaging Station	32,288	27,519	59,767	910,508	251,551	12,108	1,174,167	
Alamito Creek above Gaging Station	1,504	0	1,504	340	0	0	340	
Terlingua Creek above Gaging Station	1,070	0	1,070	188	0	0	188	
Lower Presidio to Johnson Ranch Station excluding Alamito and Terlingua Creeks	1,439	2,671	4,110	3,708	3,459	1,977	9,144	
Lower Presidio Station to Johnson Ranch Station - total	4,013	2,671	6,684	4,236	3,459	1,977	9,672	
Above Johnson Ranch Gaging Station	36,261	30,190	66,451	914,744	255,010	14,085	1,183,839	
Johnson Ranch Station to Boquillas	471	3,735	4,206	0	0	0	0	
Above Boquillas Gaging Station (Inactive) #	36,732	33,925	70,657	914,744	255,010	14,085	1,183,839	
Boquillas to Langtry Station	6,123	2,595	8,718	23	0	0	23	
Above Langtry Gaging Station	42,855	36,520	79,375	914,767	255,010	14,085	1,183,862	
Pecos River above Girvin	29,562	0	29,562	**228,360	0	0	228,360	
Pecos River, Girvin to IBWC Gaging Station	5,731	0	5,731	*** 7,387	0	0	7,387	
Pecos River above IBWC Gaging Station	35,293	0	35,293	235,747	0	0	235,747	
Goodenough Spring above Gaging Station	1	0	1	0	0	0	0	
Devils River above IBWC Gaging Station	4,185	0	4,185	0	0	0	0	
Las Vacas Arroyo above Gaging Station	0	160	160	0	742	194	1,236	
Langtry to Del Rio excluding above tributaries	416	2,495	2,911	335	0	0	335	
Langtry to Del Rio - total	39,895	2,655	42,550	236,082	742	194	237,318	
Above Del Rio Gaging Station	82,750	39,175	121,925	1,150,849	255,752	14,579	1,421,180	
San Felipe Creek above Gaging Station	46	0	46	743	0	0	743	
Pinto Creek above Gaging Station	236	0	236	50	0	0	50	
Rio San Diego above Gaging Station	0	916	916	0	17,050	0	17,050	
Rio San Diego - total	0	926	926	0	18,286	988	19,274	
Rio San Rodrigo above Gaging Station	0	591	591	0	3,707	3,212	6,919	
Rio San Rodrigo - total	0	842	842	0	6,178	3,955	10,133	
Del Rio to Eagle Pass - excluding above tributaries	1,213	314	1,527	32,165	2,470	3,212	37,847	
Del Rio to Eagle Pass - total	1,405	2,082	3,577	32,958	26,934	8,155	68,047	
Above Eagle Pass Gaging Station	84,245	11,257	125,500	1,183,807	282,686	22,734	1,409,227	
Rio Escondido above Gaging Station	0	1,279	1,279	0	6,178	8,648	14,826	
Rio Escondido - total	0	1,320	1,320	0	6,178	8,648	14,826	
Eagle Pass to El Jardín - excluding Rio Escondido - total	736	1,485	2,221	0	247	0	247	
Eagle Pass to El Jardín - total	736	2,805	3,541	0	6,425	8,648	15,073	
Above El Jardín Dam Site	84,981	44,062	129,043	1,183,807	269,111	31,382	1,504,300	
El Jardín to Laredo - total	737	1,079	1,816	7,575	1,235	0	8,810	
Above Laredo Gaging Station	85,718	15,141	130,859	1,191,382	290,346	31,382	1,513,110	
Rio Salado above Venustiano Carranza Dam	0	13,819	13,819	0	54,363	8,896	63,259	
Rio Salado above Gaging Station	0	21,503	21,503	0	106,008	19,027	125,035	
Laredo to Zapata - excluding Rio Salado	1,097	967	2,064	13,125	988	0	14,113	
Laredo to Zapata - total	1,097	22,470	23,567	13,125	106,996	19,027	139,148	
Above Zapata Gaging Station	86,815	67,611	154,426	1,204,507	397,342	50,400	1,692,258	
Zapata to Falcón Dam Site	945	169	1,114	3,365	0	0	3,365	
Above Falcón Dam Site	87,760	67,780	155,540	1,207,872	397,342	50,409	1,695,623	
Rio Alamo above Gaging Station	0	1,663	1,663	0	4,942	5,437	10,379	
Falcón Dam Site to Roma - excluding Rio Alamo	87	158	245	2,300	0	0	2,300	
Falcón Dam Site to Roma - total	87	1,821	1,908	2,300	4,942	5,437	12,679	
Above Rio Gaging Station	87,897	69,601	157,448	1,210,172	402,984	55,846	1,668,302	
Rio San Juan above Marte Gómez Dam	0	12,473	12,473	0	102,548	67,212	169,760	
Rio San Juan - total	0	12,679	12,679	0	208,803	67,212	276,015	
Roma to Rio Grande City - excluding Rio San Juan	678	181	859	3,191	0	0	3,191	
Roma to Rio Grande City - total	678	12,860	13,558	3,191	208,803	67,212	279,206	
Above Rio Grande City Gaging Station	88,525	82,461	170,986	1,213,563	611,087	123,058	1,947,508	
Rio Grande City to Hidalgo	415	430	845	0	0	0	0	
Above Hidalgo Gaging Station	88,940	82,891	171,831	611,087	123,058			
Hidalgo to Matamoros	26	26	52	93,653	0	0	93,653	
Above Matamoros Gaging Station	88,966	82,917	171,883	704,740	123,058			
Matamoros to Lower Brownsville Station	2	2	4	0	0	0	0	
Rio Grande City to Lower Brownsville Station	443	458	901	609,121	93,653	0	702,774	
Above Lower Brownsville Gaging Station	88,968	82,919	171,887	1,822,484	704,740	123,058	2,650,282	
Lower Brownsville Station to the Gulf of Mexico Above Gulf of Mexico				4,500	1,826,984			

* Includes 50 acres supplied from wells ** Includes 111,500 acres supplied chiefly from wells *** Includes 6,837 acres supplied from wells # Operated as a "Special Station in Big Bend Area"

