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WATER BULLETIN NUMBER 17

Flow of the Rio Grande
and
Tributary Contributions

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

1947

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 is the 17th annual 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, at the head of Elephant Butte Reservoir, to the Gulf of Mexico. The first publication in the series was Water Bulletin No. 1 for the year 1931. This volume contains the information for the year 1947.

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 Lower Rio Grande and the tributaries below 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 was suspended. In 1923 the work was resumed and carried on independently by the two countries until 1931 when the present joint program was started.

During 1947 the Mexican Section of the Commission operated the stream gaging stations on the Rio Grande at Juárez, Eagle Pass, Laredo, Roma, Las Palmas, and Matamoros. The United States Section operated the others. 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. More than 8,000,000 acre-feet of storage has been provided to irrigate a present total of 2,550,000 acres. The residual flow from the Rio Grande that escapes to the Gulf of Mexico averages 3,500,000 acre-feet.

While the data presented herein pertain primarily to the year 1947, similar information for earlier years is available in the previous reports of this same series, which also contain a list of the stream flow records that have been authenticated by this Commission.

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; Texas Agricultural and Mechanical College; 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 Development; National Bank of Agricultural Credit of Mexico; Meteorological Service of Mexico, and Cía. Agrícola y de Fuerza Eléctrica del Río Conchos, S.A.

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 1947

Along and Adjacent to The International Portion of the Rio Grande

The year 1947 was in general one of high temperatures and low run-off. Mean annual temperatures varied from about 2° above normal in the El Paso - Juárez Valley to about 0.5° below normal in the Lower Rio Grande Valley. Evaporation was above normal in the upper part of the watershed, principally in New Mexico, and about normal or below downstream from El Paso. Rainfall on both sides of the river below El Paso was below normal, except on the United States side between Del Rio and Laredo, where it was normal. The greatest deficiency, (71% to 72% of normal), occurred from Fort Quitman to Presidio on the main river, on the Rio Conchos below Boquilla Reservoir, on the Pecos River below Girvin, and on the Devils River. Average monthly quantities of water in storage in the large reservoirs during the year were about 48% of normal on the United States side and about 107% of normal on the Mexican side.

In volume the annual run-off of the Rio Grande during 1947 was very much below normal, having been the minimum year of record at Fort Quitman, Johnson Ranch, Eagle Pass, Matamoros, and Lower Brownsville. Variations in the percentage of normal flow ranged from 77% at El Paso to 22% at Upper Presidio. In the Lower Rio Grande Valley the volume was 65% of normal at Roma and 40% of normal at Matamoros.

The annual run-off of the measured tributaries was also much below normal. The United States tributaries contributed 56% of normal, while the Mexican tributaries upstream from the San Juan contributed 66% of normal. Rio San Juan contributed only 33% of its average for the period since March 10, 1943 when Marte Gómez Reservoir was placed in operation. The yearly flow of the Devils River was the minimum of record (43% of normal) while Goodenough Spring contributed 121% of normal. Minimum monthly discharge records since 1924 were established for various months of 1947 at many of the stations on the Rio Grande and its tributaries. There were no flood peaks of importance during the year. At Rio Grande City a maximum crest of 35,800 second-feet was reached on June 26. No overflow into the floodways on the United States side occurred.

There was a critical shortage of irrigation water on the United States side of the Lower Rio Grande Valley. The river was practically dry at Lower Brownsville for 18 days in July, while other serious shortages of several days duration were experienced in April, May, June, and November. The acreage irrigated below El Paso on the Rio Grande, on the Mexican tributaries, and on the Pecos below Girvin was larger than in previous years. The annual volume of water diverted for irrigation for the El Paso Valley was the minimum for the period 1938-1947, while it was the maximum of record for the Maverick Canal below the power plant and for the United States side below Rio Grande City. Municipal diversions on both sides of the river averaged 14% of normal.

The 1947 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 very much below normal. 1947 was the minimum year of record at all sampling points from El Paso downstream. The quantity of suspended silt passing down the Rio Grande at all sampling stations was also below normal, averaging about 63%.

RIO GRANDE AT SAN MARCIAL, NEW MEXICO

DESCRIPTION: Water-stage recorder, cable with sit-down cable car and winch located at railroad bridge about one mile below San Marcial, N.M., 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. who furnished the record. Records available: January 1895 to December 1947.

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 sec.-ft. 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.	sometimes dry.
Yearly:	Max.	3,911,	1941.	Min. 277, 1902.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	640	620	652	109	406	554	87.0	11.0	519	23.0	57.0	1,720
2	500	630	630	89.0	434	554	54.0	8.0	320	24.0	70.0	1,900
3	385	611	663	79.0	359	602	213	5.0	225	21.0	392	1,810
4	314	573	685	81.0	309	611	109	5.0	147	18.0	487	1,840
5	270	611	652	83.0	265	340	94.0	4.0	120	14.0	495	1,860
6	245	592	630	85.0	287	230	109	0	154	10.0	592	1,860
7	270	564	544	83.0	427	168	104	0	150	5.0	986	1,860
8	406	519	487	89.0	1,020	128	63.0	0	215	0	1,080	1,790
9	519	503	434	114	1,470	79.0	37.0	0	400	0	1,420	1,660
10	641	455	406	126	1,720	52.0	30.0	0	500	0	1,490	1,620
11	788	495	406	134	2,050	39.0	28.0	59.0	399	1.0	1,490	1,590
12	1,100	544	420	120	2,590	30.0	32.0	211	500	3.0	1,640	1,450
13	1,120	511	434	106	4,350	30.0	31.0	255	200	4.0	1,680	1,100
14	836	564	366	101	5,170	28.0	28.0	309	176	38.0	1,640	718
15	812	602	304	89.0	4,400	27.0	27.0	427	150	158	1,740	620
16	357	630	255	72.0	3,420	24.0	24.0	519	100	180	1,740	674
17	230	641	215	65.0	2,710	23.0	21.0	663	652	1,770	1,180	
18	260	641	191	63.0	2,280	24.0	23.0	1,990	60.0	309	1,770	1,420
19	479	630	187	55.0	2,100	23.0	47.0	4,450	50.0	245	1,660	1,300
20	685	620	183	49.0	1,880	24.0	54.0	3,350	45.0	220	1,720	1,420
21	812	611	179	46.0	1,290	26.0	128	1,950	150	222	1,700	1,300
22	888	620	150	43.0	1,020	27.0	158	1,510	200	147	1,860	958
23	812	652	126	39.0	848	27.0	183	1,550	98.0	140	1,900	776
24	740	685	101	37.0	788	23.0	187	5,030	80.0	134	1,950	685
25	685	663	99.0	35.0	986	20.0	179	2,500	60.0	114	1,840	696
26	652	630	101	35.0	1,200	18.0	97.0	1,810	34.0	87.0	1,770	685
27	641	641	131	36.0	972	37.0	44.0	1,420	30.0	123	1,740	620
28	582	630	137	43.0	902	60.0	33.0	1,150	26.0	128	1,620	650
29	573	131	137	788	114	30.0	812	22.0	89.0	1,790	620	
30	564	126	250	582	729	23.0	527	23.0	97.0	1,740	602	
31	564	106					17.0	573	76.0		641	
Sum			16,688	2,493.0	4,062.0	2,294.0	29,098.0	3,282.0	5,033.0	41,829.0	37,605	
	18,370		10,131.0	47,752								

Sum	16,688	2,493.0	4,062.0	29,098.0	3,282.0	37,605
	18,370	10,131.0	47,752	2,294.0	5,033.0	41,829.0

Current Year 1947							Period 1924-1947			Acre-Feet	
Month	Extreme Gage Feet		# Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet			Normal 1938-1947	
	High	Low	Day	High	Low						
Jan.	13	1,120	6	245	593	36,400	44,085	72,600	17,400	46,840	
Feb.	24	685	10	455	596	33,100	46,572	77,100	29,600	44,610	
Mar.	4	685	25	99.0	327	20,100	56,434	119,000	20,100	55,750	
Apr.	30	250	\$25	35.0	85.1	4,940	117,788	432,000	3,940	94,818	
May	14	5,170	5	265	1,540	94,700	272,410	99,000	4,450	286,629	
June	4	611	26	18.0	135	8,060	151,182	609,000	#	32.7	
July	3	213	31	17.0	74.0	4,550	53,944	246,000	0	163,694	
Aug.	19	4,450	\$ 6	0	939	57,700	46,074	275,000	1,620	56,450	
Sept.	1	519	29	22.0	168	9,980	48,833	308,000	2,920	33,277	
Oct.	17	692	\$ 8	0	106	6,510	38,843	221,000	0	45,391	
Nov.	24	1,950	1	57.0	1,390	83,000	36,706	171,000	2,550	47,069	
Dec.	2	1,900	30	602	1,210	74,600	47,315	95,300	15,100	57,560	
Yearly				5,170	0	599	433,640	960,186	2,832,100	244,489	970,253

Mean daily ♀ And other days ■ Estimated

RIO GRANDE BELOW ELEPHANT BUTTE DAM, NEW MEXICO

DESCRIPTION: Water-stage recorder one mile 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 155.1 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: Based upon 43 meter measurements during the year and a stable rating curve. Records furnished by the El Paso office of the United States Bureau of Reclamation. Records available: January 1915 to December 1947.

REMARKS: The station described here is operated by the Bureau of Reclamation. 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.	7,590	May 1942.	Min.	3.0 Jan. 1930.
Yearly:	Max.	2,510	1942.	Min.	771 1947.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,040	843	924	1,270	1,180	797	1,120	1,030	937	200	122	155
2	1,120	687	691	1,340	1,070	1,020	1,190	1,000	679	205	112	126
3	1,100	940	1,080	1,300	955	1,140	1,160	1,040	697	202	138	138
4	974	1,050	968	1,280	840	1,140	982	907	623	198	137	130
5	644	1,080	981	1,060	1,090	1,070	909	1,050	915	191	153	128
6	1,070	1,080	1,090	796	1,120	1,120	867	1,080	710	195	141	104
7	1,030	1,230	1,030	1,110	1,150	1,080	1,100	1,070	762	201	120	206
8	960	942	889	1,260	1,120	978	1,160	1,060	653	203	106	149
9	1,050	959	712	1,300	1,080	1,060	1,180	1,060	582	207	81.0	146
10	1,000	1,020	971	1,140	1,040	1,200	1,140	949	222	201	105	147
11	872	1,150	975	1,240	865	1,360	1,180	1,050	311	194	97.0	141
12	779	1,060	970	986	1,090	1,370	1,090	1,460	281	187	119	259
13	903	1,070	967	807	1,170	1,160	964	1,530	235	228	124	111
14	997	1,050	1,000	1,130	1,260	1,090	1,140	1,290	241	197	111	88.0
15	1,060	916	735	1,200	1,180	1,090	1,210	1,220	257	200	101	152
16	1,070	709	673	1,210	1,120	1,250	1,110	1,270	255	201	93.0	179
17	1,240	987	933	1,180	1,050	1,150	1,190	1,570	267	191	180	164
18	1,020	1,040	972	1,170	885	1,340	1,130	1,530	292	198	399	177
19	824	990	1,020	1,100	1,030	1,130	1,060	1,510	470	177	401	183
20	970	1,010	1,000	880	1,090	1,090	983	1,450	237	220	129	178
21	929	897	1,050	1,200	1,080	972	1,200	1,440	259	205	130	159
22	919	875	858	1,260	1,110	933	1,250	1,180	237	190	133	208
23	924	642	447	1,250	1,210	1,100	1,220	793	194	205	156	183
24	907	1,050	1,220	1,320	1,010	1,240	1,250	720	185	241	130	113
25	831	1,300	1,160	1,330	798	1,270	1,270	731	178	571	147	92.0
26	671	1,120	1,130	1,100	1,040	1,150	1,150	1,090	741	177	205	120
27	915	1,110	1,140	925	1,260	1,290	873	334	179	112	108	143
28	1,030	1,070	1,110	1,100	1,080	1,050	1,050	1,090	274	175	140	86.0
29	1,010	842	1,240	1,090	1,240	1,060	1,050	199	184	123	116	150
30	932	730	1,370	1,050	1,100	1,260	1,260	270	206	141	89.0	138
31	1,050		1,150		968		1,270	670		128		144
Sum	27,877	34,854	33,720	31,478	6,257							4,597.0
	29,801	29,438	33,091	34,628	11,400							4,248.0

Current Year 1947**Period 1924-1947**

Month	Extreme Gage Feet			Average Second-Feet		Total Acre-Feet	Acre-Feet			Acre-Feet Normal 1928-1947		
	High	Low	Day	High	Low		Normal	Maximum	Minimum			
Jan.				17	1,240	5	644	961	59,100	23,136	86,500	184
Feb.				25	1,300	23	642	996	55,300	36,141	76,300	969
Mar.				24	1,220	23	447	950	58,400	61,672	88,700	1,520
Apr.				30	1,370	6	796	1,160	69,100	104,350	162,000	53,010
May				14	1,260	25	798	1,070	65,600	111,342	167,000	63,000
June				12	1,370	1	797	1,120	66,900	118,883	363,000	64,400
July				25	1,270	6	867	1,120	68,700	118,121	211,000	72,700
Aug.				17	1,570	29	199	1,020	62,400	112,238	161,000	68,700
Sept.				1	937	28	175	380	22,600	70,012	129,000	22,600
Oct.				25	571	27	112	202	12,400	30,514	72,100	506
Nov.				19	401	9	81.0	142	8,430	29,225	158,000	884
Dec.				12	259	28	86.0	148	9,120	28,535	87,300	916
Yearly					1,570		81.0	771	558,050	844,169	1,818,800	558,050

Mean daily

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. Elevation of zero of the gage was 4,147.90 ± .2 feet from February 26, to October 7, 1938, when it was changed to 4,146.90 ± .2 feet. On October 13, 1938, it was changed to 4,145.90 ± .2 feet and on January 1, 1946, it was changed to 4,140.90 ± .2 feet. All elevations are above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 85 meter measurements during the year. Records available: February 26, 1938, to December 31, 1947. 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 the Rio Grande 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 1947 from Caballo Reservoir into a small irrigation canal (Bonito Lateral) just below the dam 1,717 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.	1.3 Dec. 12, 1940.	
Monthly:	Max.	6,710	May 1942.	Min.	1.4 Dec. 1940.	
Yearly:	Max.	2,480,	1942.	Min.	972	1941.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.9	17.0	487	2,770	1,520	1,740	2,180	2,420	2,040	2.0	1.8	1.8
2	8.0	17.8	42.0	2,640	1,620	1,760	2,170	2,600	2,090	1.9	1.8	1.8
3	8.0	18.6	43.8	2,490	1,600	1,750	2,240	2,660	2,180	1.6	1.8	1.8
4	7.9	19.3	49.1	2,410	1,610	1,780	2,320	2,520	2,190	1.7	1.8	1.8
5	8.0	20.0	55.0	2,520	1,540	1,810	2,400	2,450	2,000	1.8	1.8	1.8
6	8.2	21.0	54.4	2,700	1,520	1,920	2,480	2,430	2,270	1.9	1.8	1.8
7	8.1	21.7	55.8	2,720	1,620	2,100	2,520	2,320	2,340	1.9	1.8	1.8
8	8.1	21.8	53.1	2,740	1,680	2,180	2,670	2,280	2,070	1.9	1.8	1.8
9	8.3	24.0	53.1	2,580	1,360	2,080	2,720	2,290	1,900	1.9	1.8	1.8
10	8.3	25.1	54.0	2,550	1,010	1,990	2,810	2,310	1,730	1.8	2.0	1.8
11	8.5	26.1	54.9	2,490	1,140	2,010	2,740	2,290	1,660	1.8	2.0	1.8
12	8.9	27.1	52.1	2,510	1,260	2,100	2,720	2,350	1,260	1.8	1.7	1.8
13	9.0	28.3	52.4	2,590	1,240	2,030	2,700	2,450	230	1.8	1.6	1.8
14	9.0	29.0	58.7	2,530	1,290	2,110	2,680	2,540	148	1.8	1.8	1.8
15	9.1	30.1	690	2,380	1,260	2,120	2,590	2,480	199	1.8	1.7	1.8
16	9.1	32.1	1,820	2,280	1,080	2,120	2,500	2,140	145	1.8	1.7	1.8
17	9.2	33.9	1,920	2,020	1,320	2,070	2,410	1,890	52.0	1.8	1.6	1.8
18	9.4	36.3	1,950	1,740	1,470	1,690	2,160	1,120	18.0	1.7	1.7	1.9
19	9.5	36.9	1,880	1,530	1,510	1,310	2,080	828	7.0	1.7	1.8	1.9
20	9.6	32.0	1,830	1,490	1,260	1,260	2,180	1,220	4.6	1.6	1.8	2.0
21	10.3	27.0	1,970	1,470	1,430	1,420	2,200	1,330	4.1	1.8	1.9	2.0
22	10.8	369	2,350	1,440	1,400	1,660	2,220	1,300	3.5	1.8	1.9	2.0
23	11.4	1,030	2,510	1,410	1,260	1,680	2,270	1,060	3.2	1.7	1.9	2.0
24	12.0	1,030	2,500	1,470	1,310	1,750	2,320	933	2.7	1.7	1.9	2.1
25	12.6	908	2,600	1,540	1,400	1,850	2,250	931	2.3	1.6	1.9	2.1
26	13.2	776	2,690	1,440	1,390	1,860	2,350	1,080	1.8	1.8	1.8	2.1
27	14.1	707	2,750	1,390	1,390	1,960	2,470	1,240	1.8	1.9	1.8	2.0
28	14.6	712	2,740	1,360	1,390	2,180	2,360	1,360	1.9	2.0	1.8	2.0
29	15.0	2,750	1,420	1,350	2,180	2,250	1,360	2.1	1.9	1.8	1.9	
30	15.6	2,780	1,480	1,380	2,190	2,360	1,670	2.1	1.9	1.8	1.9	
31	16.3	2,770	1,610				2,430	1,900	1.8			1.9
Sum		6,077	62,100		56,660		57,752		55.9			58.4
		318.0	39,657.4		43,440		74,750		24,559.1			54.1

Current Year 1947

Period 1938-1947

Month	# Extreme Gage Feet			High	Low	Day	Average Second-Feet	Total Acre-Feet	Acre-Feet			
	High	Low	Day						Normal	Maximum	Minimum	
Jan.	31	16.3	\$ 1	7.9	10.3			631	1,506	4,850	97.0	
Feb.	423	1,050	1	17.0	217			12,100	23,226	64,300	7,260	
Mar.	30	2,780	2	42.0	1,280			78,700	80,260	95,100	49,300	
Apr.	1	2,770	28	1,360	2,070			123,000	130,510	212,000	106,000	
May	8	1,680	10	1,010	1,400			86,200	134,840	412,000	86,200	
June	30	2,190	20	1,260	1,890			112,000	143,660	354,000	112,000	
July	10	2,810	19	2,080	2,410			148,000	141,540	234,000	109,000	
Aug.	3	2,660	19	828	1,860			115,000	131,980	179,000	110,000	
Sept.	7	2,340	\$26	1.8	819			48,700	77,080	181,000	34,500	
Oct.	\$ 1	2.0	\$ 3	1.6	1.8			111	14,518	35,400	111	
Nov.	\$10	2.0	\$13	1.6	1.8			107	7,508	14,400	107	
Dec.	\$24	2.1	\$ 1	1.8	1.9			116	8,379	19,100	83.3	
Yearly				2,810			1.6	1,000	724,665	895,007	1,795,620	703,547

Mean daily \$ And other days

RIO GRANDE AT EL PASO, TEXAS

DESCRIPTION: Staff gage and cable with sit-down cable car and winch 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 1947 were computed by taking the sum of the flows in the American Canal and the flows at the station below American Dam. Records available: 1889-1947. 1947 records good.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. COMPARATIVE FLOW 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,					Min.	70.1 1902.			

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	171	152	306	1,230	838	709	1,010	996	1,180	297	188	165
2	170	152	374	1,470	895	883	934	1,050	1,170	289	192	168
3	171	151	453	1,290	906	1,010	894	1,060	989	286	192	187
4	178	166	387	917	1,030	987	902	1,340	1,010	281	185	175
5	178	147	233	951	1,020	928	1,020	1,380	968	274	206	164
6	171	143	214	1,210	1,010	905	1,130	1,220	1,010	276	199	164
7	179	144	234	1,200	982	1,080	1,180	1,140	943	273	180	168
8	187	147	239	1,220	845	1,170	1,130	1,120	1,120	271	178	158
9	190	146	227	1,290	911	1,450	1,090	1,040	1,060	264	177	159
10	190	147	209	1,350	1,030	1,280	1,240	1,070	921	263	175	155
11	170	145	198	1,080	1,060	1,160	1,330	1,070	829	263	174	157
12	166	145	185	1,160	821	1,100	1,270	1,000	729	256	166	155
13	162	145	179	1,140	691	1,020	1,210	1,720	754	261	168	157
14	162	145	175	1,340	664	1,060	1,240	951	1,030	282	172	156
15	154	144	177	1,260	646	1,190	1,170	1,140	818	234	177	153
16	148	145	172	1,090	644	1,320	1,300	1,390	605	227	170	153
17	150	143	163	1,140	733	1,210	1,320	2,170	578	221	178	150
18	148	141	796	1,290	732	1,200	1,240	2,510	547	225	173	146
19	150	140	874	1,170	720	1,490	1,240	1,610	458	221	170	148
20	147	139	783	953	899	1,390	1,220	1,150	414	216	169	145
21	152	140	672	874	963	1,030	1,140	1,260	382	208	166	147
22	157	142	740	838	915	864	1,080	1,090	364	200	162	147
23	150	143	944	824	865	914	1,050	1,490	352	199	168	143
24	146	144	1,260	779	886	913	1,010	1,940	347	201	167	141
25	148	145	1,100	788	832	860	1,010	1,360	334	201	166	147
26	146	319	992	896	819	851	1,070	1,080	329	197	163	143
27	154	564	1,230	1,150	855	921	1,100	1,060	311	196	165	144
28	152	282	1,190	1,090	776	892	1,200	975	303	191	166	144
29	140		1,360	893	734	896	1,170	922	296	194	166	142
30	142		1,380	882	720	1,180	1,140	1,020	294	192	163	139
31	144		1,340	700			1,100	896	188			148
Sum		4,606		32,765		31,863		39,220		7,347		4,768
	4,973		18,786		26,122		35,140		20,445		5,241	

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1947			
	High	Low	Day	High	Low			Normal	Maximum	Minimum				
Jan.	3.80	3.44	4	203	29	137	160	9,860	11,245	17,500	8,210	11,366		
Feb.	4.35	3.36	26	393	19	138	164	9,140	20,001	52,200	7,230	18,297		
Mar.	5.99	3.38	31	1,610	17	155	606	37,300	40,841	62,500	18,400	43,160		
Apr.	6.27	4.83	14	1,820	23	772	1,090	65,000	67,384	139,000	44,900	72,830		
May	5.85	4.79	11	1,160	15	588	843	51,800	78,710	357,000	47,600	93,470		
June	6.26	4.96	9	1,580	1	691	1,060	65,200	79,122	304,000	56,200	91,580		
July	6.12	5.26	17	1,820	3	875	1,130	69,700	84,638	198,000	68,900	87,910		
Aug.	7.36	5.11	13	3,920	13	949	1,270	77,800	88,276	158,000	61,000	85,880		
Sept.	6.39	3.96	1	1,470	30	289	682	40,600	66,483	171,000	40,600	69,540		
Oct.	4.06	3.60	14	346	31	186	237	14,600	27,197	57,900	14,600	28,930		
Nov.	3.74	3.50	5	206	12	160	175	10,400	17,758	29,500	10,400	16,640		
Dec.	3.66	3.48	3	207	30	138	154	9,460	16,764	27,700	9,460	16,436		
Yearly	7.36	3.36		3,920		137	634	458,860	598,419	1,559,200	453,900	636,039		

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 upon 53 meter measurements during the year. Computations by shifting channel methods. Records available: June 1, 1938 to December 31, 1947. 1947 records good.

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 (see preceding page) 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.

		<u>Average Flow in Second-Feet</u>			
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 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	16.8	97.5	28.9	101	172	183	158	160	270	28.8	12.0	10.3
2	18.2	28.7	28.0	289	219	166	159	153	293	9.0	14.5	9.1
3	22.8	25.4	28.0	158	221	171	155	156	179	7.4	12.8	11.0
4	22.8	32.2	28.0	125	218	177	160	159	176	8.2	14.7	10.0
5	22.8	17.3	28.0	124	211	177	161	160	174	7.2	9.1	10.0
6	127	7.6	34.0	127	214	177	156	161	180	6.3	6.6	12.5
7	179	10.2	32.0	122	213	181	155	162	174	5.9	4.7	12.5
8	187	11.3	28.9	120	204	183	153	160	180	6.1	5.0	13.3
9	190	12.8	28.9	114	224	181	154	155	178	5.8	5.0	12.6
10	190	12.7	27.0	110	226	181	152	153	173	5.3	5.1	12.0
11	170	12.7	26.0	113	214	182	160	151	166	4.9	4.9	12.6
12	166	12.7	27.0	116	208	174	160	149	176	4.8	5.2	11.9
13	162	12.7	30.0	124	222	176	159	178	186	4.6	4.7	10.0
14	162	12.9	31.9	147	230	175	155	159	195	4.2	5.9	13.1
15	154	13.1	31.7	120	224	174	153	141	163	4.4	7.6	13.6
16	148	12.7	31.5	124	218	177	158	294	156	4.4	7.1	12.2
17	150	13.4	31.4	126	214	174	182	1,100	90.4	4.1	6.8	11.6
18	148	16.7	34.2	126	206	164	168	1,510	81.9	3.7	7.8	11.5
19	150	17.5	33.0	124	209	156	168	568	64.5	3.4	9.1	12.1
20	147	17.1	33.8	123	206	163	166	383	55.0	3.0	8.6	12.0
21	152	16.3	32.8	121	213	159	157	181	48.6	2.7	10.4	12.3
22	157	15.5	34.8	122	219	159	156	211	49.8	2.3	9.8	11.7
23	150	14.7	37.2	122	223	171	148	547	49.0	2.0	9.1	11.7
24	146	13.9	126	120	228	181	141	847	52.0	2.7	9.7	13.1
25	148	11.6	42.0	125	229	177	145	179	53.1	2.9	10.2	13.7
26	146	10.2	37.8	126	227	173	151	173	53.2	2.7	10.2	13.1
27	75.2	8.4	39.2	124	222	164	154	170	51.3	2.7	10.8	12.4
28	31.8	6.0	39.2	119	207	168	167	153	51.4	4.7	9.6	11.8
29	86.6		231	115	208	163	174	160	51.4	11.9	9.7	11.8
30	142		65.0	118	211	162	178	163	51.5	11.9	9.0	11.1
31	144		88.5	211				179	154	11.3		10.5
Sum	493.8		3,845		5,169			9,740		189.3		368.0

^a Estimated # The average, maximum and minimum discharges for January through May are for period 1939-1947.

OUTFALLS FROM WELLS

Near El Paso, Texas, and Juarez, 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 1947 such outfalls contributed a total of 11,807 acre-feet of water to the Rio Grande flow, which is equivalent to an average steady flow of 16.3 second-feet during the year. Of this total flow 16.0 second-feet, or 11,590 acre-feet, came from the United States side, while 0.3 second-feet, or 217 acre-feet, came from the Mexican 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, it is calculated that 1,574 acre-feet flowed into the river in 1947. This corresponds to an average flow of 2.2 second-feet.

JUAREZ SEWAGE OUTFALL

This outfall enters the river 4.7 miles below the American Dam. From several inspections this outfall is estimated at 217 acre-feet for 1947, which corresponds to an average flow of 0.3 second-feet.

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 1947 record of total outfall consists of flows measured by a Parshall meter and estimates of amounts which bypassed 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 130 acres of land was diverted from this outfall between the sewage plant and the Rio Grande.

Month	1947				Period 1936-1947	
	From Wells		From Rio Grande		Diversions	To Rio Grande
	Mean Sec.-Ft.	Acre-Feet	Mean Sec.-Ft.	Acre-Feet	Acre-Feet	Acre-Feet
Jan.	12.9	795	0.6	35	0	830
Feb.	11.8	656	1.8	99	0	755
Mar.	9.2	565	4.3	267	0	832
Apr.	9.1	544	4.6	275	107	712
May	11.8	723	3.3	201	103	821
June	11.5	684	4.6	274	103	855
July	11.9	732	5.1	314	118	928
Aug.	11.8	725	5.0	309	126	908
Sept.	10.9	651	4.9	294	93	852
Oct.	8.3	511	6.1	373	0	884
Nov.	6.9	413	6.6	394	0	807
Dec.	4.6	282	8.9	550	0	832
Year	10.1	7,281	4.6	3,385	650	10,016
						8,765

RIO GRANDE AT JUÁREZ, 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 on the rectified channel of the Rio Grande, 7.0 river miles below the American Dam at El Paso, Texas and 4.9 river miles below the International Dam. On January 1, 1943 the zero of the gage was lowered 3.28 feet. The zero of the present gage is 3,683.98 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 155 meter measurements during the year, 150 by the Mexican and 5 by the United States Section. Computations by shifting channel methods. Records available: April 1, 1938 to December 31, 1947. 1947 records good.

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 sec.-ft. 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.	5,300,	May	1942.	Min.	45.9	Dec.	1947.
Yearly:	Max.	1,820,		1942.	Min.	367,		1947.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	134	143	124	851	329	204	547	537	600	245	164	43.1
2	138	137	144	1,260	315	364	445	586	731	267	151	43.4
3	142	133	246	985	344	530	431	650	491	258	58.3	50.1
4	142	132	253	554	473	512	452	833	533	243	51.9	50.5
5	158	137	150	590	512	441	558	971	509	228	45.2	47.0
6	177	136	165	851	487	399	682	770	537	91.8	53.3	50.1
7	176	134	171	795	441	586	710	713	480	79.8	47.7	50.1
8	202	132	195	858	307	696	699	675	583	82.3	39.6	50.1
9	202	139	176	897	344	971	671	590	569	82.3	50.9	46.3
10	238	136	89.0	897	501	791	830	618	463	82.3	156	46.3
11	213	131	44.1	650	682	681	936	688	353	59.3	160	44.8
12	185	133	36.0	699	337	643	876	562	295	52.3	162	52.3
13	182	130	33.5	749	199	523	837	1,170	277	210	165	49.1
14	180	135	35.3	879	170	523	798	* 487	515	233	165	48.4
15	178	119	35.3	833	163	699	731	671	424	197	150	54.4
16	153	123	32.8	653	143	819	886	* 929	233	204	149	49.4
17	200	122	59.0	699	185	770	886	* 1,650	348	198	110	44.5
18	198	110	569	795	210	685	805	1,860	455	207	56.8	45.6
19	174	122	530	742	190	1,010	* 758	1,130	402	206	57.9	43.1
20	173	96.8	459	498	360	985	* 780	840	353	44.5	51.9	39.2
21	175	58.6	399	459	463	569	660	* 801	305	37.1	53.0	35.7
22	177	107	625	431	396	406	593	* 710	* 81.2	39.6	48.7	38.1
23	172	67.5	692	399	322	385	618	* 933	* 50.1	38.8	43.1	37.8
24	141	47.7	1,090	351	332	396	576	* 1,250	* 44.5	38.5	45.6	40.6
25	140	50.9	837	317	324	352	530	886	39.2	35.0	43.4	41.0
26	139	208	699	473	256	349	579	614	37.1	48.7	41.3	44.1
27	139	205	897	971	269	470	600	685	36.0	166	40.6	44.1
28	96.1	125	858	724	226	399	660	597	55.8	168	39.2	34.3
29	108	1,270	458	210	378	703	455	248	164	37.4	36.7	37.4
30	117	1,110	434	204	629	646	565	239	164	37.4	38.8	39.2
31	116	1,150		181	660	470		170				83.3
Sum	3,450.5	20,732	17,165				* 24,776	4,340.3	1,422.3			
	5,065.1	13,174.0	9,875				21,183	10,286.9	2,477.0			

Current Year 1947 Period 1938-1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High	Low			Normal	Maximum	Minimum
Jan.	3.58	3.08	10	263	28	52.3	163	11,611	13,270	9,440
Feb.	3.90	2.76	26	340	25	43.1	123	6,840	12,556	4,730
Mar.	4.95	2.53	29	1,600	17	18.0	425	26,130	45,790	14,140
Apr.	5.64	3.38	27	1,910	4	413	691	41,120	47,734	30,900
May	5.02	3.08	11	925	17	135	319	19,590	325,100	19,590
June	5.71	3.25	9	1,110	1	174	572	34,050	61,554	272,400
July	6.36	4.07	17	1,770	3	410	683	42,020	58,081	162,500
Aug.	6.79	3.74	18	3,140	18	399	* 799	* 49,140	57,208	38,700
Sept.	5.58	2.30	2	950	28	26.8	343	20,400	45,453	14,380
Oct.	3.64	2.46	14	295	12	26.8	140	8,610	20,203	8,610
Nov.	3.38	2.49	14	182	9	29.3	82.6	4,910	10,579	4,910
Dec.	3.22	2.36	31	153	26	29.7	45.9	2,820	10,565	2,820
Yearly	6.79	2.30		3,140		18.0	367	265,680	424,829	1,315,890
										265,680

* Partly estimated @ Period 1939 to 1947

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 Augustin, 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 upon 80 meter measurements during the year, 55 by the United States and 25 by the Mexican Section of this Commission. Computations by shifting channel methods. January and February records very poor, March through December good. Records available: August 17, 1938 to December 31, 1947.

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.	60.6								1940.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	104	122	18.5	64.3	11.4	18.4	16.2	17.6	38.1	53.9	95.5	13.3
2	108	115	24.9	140	9.7	17.1	12.7	12.0	121	110	100	7.6
3	108	99.8	19.0	128	8.8	20.0	12.5	12.2	24.0	85.2	70.6	7.5
4	103	99.2	19.4	65.2	9.9	23.0	10.8	13.0	18.3	98.5	9.5	6.2
5	113	89.7	19.0	47.3	16.3	17.4	9.2	37.5	16.6	235	4.9	6.2
6	129	94.9	18.4	* 57.4	12.1	15.2	13.8	18.6	16.6	97.7	3.4	6.1
7	144	91.4	19.2	37.9	11.9	14.6	15.3	16.0	15.3	7.5	3.2	6.0
8	161	90.8	18.6	36.1	11.7	15.9	12.3	15.5	14.2	2.1	2.1	8.7
9	194	95.9	17.4	34.9	19.3	103	12.2	14.9	15.4	* 3.1	2.8	11.0
10	170	95.2	16.8	56.2	225	37.4	11.5	14.0	15.4	4.2	39.1	11.7
11	152	91.7	15.6	30.5	600	16.6	12.4	13.2	14.2	* 5.2	29.2	11.2
12	143	88.2	14.3	26.3	139	12.7	12.6	13.3	12.5	* 6.3	12.1	11.0
13	142	84.5	14.0	* 34.4	41.6	10.3	35.0	* 34.7	10.7	* 7.3	13.4	11.1
14	130	84.7	11.9	92.3	28.4	9.4	17.5	* 42.7	9.0	* 8.4	12.7	11.6
15	129	77.4	10.4	27.7	21.6	10.3	15.6	* 38.8	12.0	9.4	10.7	11.7
16	124	88.0	10.1	37.2	18.6	47.5	18.9	* 45.5	12.7	* 7.8	9.6	11.1
17	132	118	10.3	15.3	16.8	23.8	92.2	* 937	12.1	* 6.2	8.6	10.1
18	133	91.2	35.3	24.0	18.5	18.4	71.7	* 1,640	15.2	* 4.6	12.7	9.7
19	126	76.9	61.5	131	21.4	321	27.1	* 918	13.0	* 3.8	50.0	9.9
20	124	73.7	17.1	188	23.1	516	46.8	302	13.2	* 3.0	40.1	10.3
21	122	41.2	15.8	* 21.3	24.8	71.2	25.4	315	11.0	* 2.1	37.7	10.9
22	120	64.2	14.6	* 15.7	24.9	47.6	18.6	183	6.0	* 1.3	36.7	11.2
23	117	76.8	13.9	* 12.5	24.7	32.4	15.4	370	4.1	* 6.9	34.5	11.4
24	118	65.5	* 9.8	24.7	25.1	14.6	886	886	2.8	* 8.7	14.3	12.5
25	122	45.2	45.4	8.5	24.7	21.7	15.6	554	2.8	* 17.3	13.2	13.1
26	123	20.6	15.4	8.2	27.6	16.6	16.4	219	2.3	* 15.7	13.1	16.3
27	118	92.4	13.4	22.3	26.2	14.6	18.0	148	1.8	* 48.9	12.7	85.5
28	127	19.5	19.5	130	26.3	14.8	39.4	97.5	2.3	* 43.7	13.4	83.1
29	116	113	18.0	25.6	14.2	198	78.8	38.9	21.0	13.5	77.6	
30	120	149	12.8	22.6	15.0	130	59.0	55.8	29.6	13.7	35.2	
31	122		67.4	19.7		91.2	47.0	47.0	60.0		32.6	
Sum		2,252.6		1,531.1		1,541.2		7,426.1		1,014.4		579.4
		3,994		925.6		1,536.9		1,058.9		547.3		733.0

Current Year 1947

Period 1938-1947 *

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet		
	High	Low	Day	High	Low			Average	Maximum	Minimum
Jan.	10.27	9.78	10	248	29	85.2	129	7,920	9,676	11,900
Feb.	10.15	9.32	27	203	26	15.4	80.4	4,470	8,413	37,000
Mar.	10.58	9.25	29	506	16	10.1	29.9	1,840	5,678	21,000
Apr.	11.02	9.09	28	1,040	26	6.8	51.0	3,040	12,103	70,500
May	10.94	9.08	11	914	3	8.8	49.6	3,050	37,217	299,800
June	10.87	9.01	20	853	15	8.0	51.4	3,060	31,066	241,000
July	11.30	9.07	17	1,600	5	7.6	34.2	2,100	20,400	118,500
Aug.	12.50	9.23	17	2,440	15	12.0	240	14,700	21,046	2,460
Sept.	10.03	8.96	2	257	27	1.8	18.2	1,090	22,520	119,200
Oct.	10.00	8.80	5	240	22	1.3	32.7	2,010	10,361	1,620
Nov.	9.86	8.74	1	173	8	2.0	24.4	1,450	2,306	7,270
Dec.	9.72	8.82	27	91.0	7	5.7	18.7	1,150	4,596	12,900
Yearly	12.50	8.74		2,440		1.3	63.4	45,880	185,382	1,079,340
										43,965.5

* The average, maximum, and minimum discharges for January through August are for the period 1939-1947.

* Partly estimated. * Estimated

RIO GRANDE AT COUNTY LINE

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located 0.8 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 upon 79 meter measurements during the year. 54 by the United States and 25 by the Mexican Section of this Commission. Computations by shifting channel methods. January and February records very poor, March and April fair, and May to December good. Records available: January 1, 1938 to December 31, 1947.

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. 3.8 second-feet on October 13, 1947 with a gage height of 2.05 feet.

	Average Flow in Second-Feet								
Daily:	Max.	6,180	May 18, 1942.	Min.	4.3		Oct. 12, 1947.		
Monthly:	Max.	4,920	May 1942.	Min.	21.4		July 1947.		
Yearly:	Max.	1,720,	1942.	Min.	131				

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	238	189	125	123	65.8	26.2	16.9	11.2	95.7	32.4	27.2	181
2	219	187	127	111	52.9	29.3	11.1	10.0	51.3	28.3	45.6	180
3	200	185	93.2	268	43.8	21.7	11.5	12.3	49.6	49.9	46.2	183
4	* 195	186	76.2	208	52.2	26.2	9.0	20.3	30.4	41.0	38.6	214
5	# 196	184	72.9	126	84.0	24.3	7.1	17.6	21.8	72.2	32.6	202
6	# 196	184	79.5	94.3	81.3	23.3	9.2	24.8	20.7	73.3	58.5	178
7	* 194	187	81.5	122	75.6	16.0	8.6	21.3	21.0	30.7	87.2	173
8	192	188	58.5	114	82.1	24.9	10.2	16.5	23.3	7.9	139	175
9	197	180	51.5	120	152	33.4	10.7	14.4	42.7	5.6	136	180
10	# 207	186	49.0	140	392	118	8.5	12.5	45.3	6.0	148	160
11	* 197	180	44.0	166	706	98.6	6.6	11.3	25.1	5.6	124	161
12	* 188	188	38.3	107	388	101	6.5	10.2	15.2	4.3	161	187
13	188	188	37.7	166	220	99.3	6.4	30.7	9.9	5.7	144	192
14	186	182	36.4	218	211	80.2	13.2	176	7.6	9.4	141	193
15	186	177	34.2	175	128	86.3	9.6	11.6	132	11.4	156	169
16	196	178	43.4	* 154	98.8	187	7.4	7.4	238	8.8	165	123
17	233	178	48.0	* 189	59.9	218	6.4	1,230	126	8.2	185	123
18	224	179	75.8	# 228	64.7	244	68.5	1,690	129	10.4	185	88.4
19	* 205	150	344	* 282	70.7	523	66.8	1,550	120	16.3	170	103
20	205	153	154	394	56.9	824	55.8	661	51.9	53.5	113	127
21	201	131	106	165	62.6	389	110	508	16.8	55.8	125	129
22	201	118	72.5	85.2	44.6	252	56.2	381	27.6	38.0	186	126
23	201	142	65.0	* 71.6	54.5	189	28.2	406	50.5	52.1	139	138
24	202	127	82.0	77.0	52.7	111	13.3	1,020	34.0	26.7	138	118
25	194	108	77.3	44.5	76.8	11.2	937	29.9	27.9	199	118	
26	192	103	62.9	# 92.1	39.6	49.7	9.8	409	38.4	31.1	171	137
27	187	151	60.8	* 109	27.9	26.3	8.4	370	38.4	38.3	182	110
28	196	136	106	# 128	23.8	20.4	13.2	312	44.7	26.2	191	87.8
29	188	117	110	28.0	16.6	32.5	266	47.6	23.4	197	100	
30	183	194	* 85.0	31.0	16.7	16.0	212	37.5	11.1	190	101	
31	192	136	27.6		14.3	159			15.6		149	
Sum	4,617		* 4,505.5		3,952.2		10,519.1	801.1		4,606.2		
* 6,179	2,778.3		3,522.5		563.1		1,621.9	4,020.9				

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High	Low			Normal	Maximum	Minimum
Jan.	3.36	2.84	17	347	29	143	* 199	* 12,300	20,000	11,300
Feb.	3.29	2.67	27	284	27	92.8	165	9,160	15,199	4,790
Mar.	3.57	2.17	19	536	15	33.4	89.6	5,510	14,399	5,510
Apr.	3.88	2.42	20	864	22	51.7	* 150	* 8,940	22,418	84,200
May	3.85	2.13	11	878	28	22.2	114	6,990	43,273	303,000
June	4.11	1.89	19	1,040	7	11.8	132	7,840	37,776	6,870
July	3.41	1.78	18	311	5	4.5	21.4	1,320	33,062	140,000
Aug.	5.53	1.85	18	4,340	16	6.2	339	20,900	33,370	123,000
Sept.	3.60	1.92	16	485	15	5.1	54.1	3,220	55,651	140,000
Oct.	2.75	2.05	5	90.2	13	3.8	25.8	1,590	22,899	61,400
Nov.	3.33	2.33	24	303	1	19.4	134	7,980	14,401	20,400
Dec.	3.17	2.24	31	208	18	24.2	149	9,140	16,801	29,700
Yearly	5.53	1.78		4,340		3.8	131	94,890	305,199	1,247,500
										94,890

* Partly estimated # Estimated

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 upon 79 meter measurements during the year, 54 by the United States and 25 by the Mexican Section of this Commission. Computations by shifting channel methods. 1947 records for January and February very poor due to unstable gage height-discharge relationship during this period; March through December good. Records available: January 1923 to December 1947.

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

COMPARATIVE FLOWS FROM RECORDS #: Momentary Peak: Max. 17,000 second-feet about June 20, 1905. Min., frequently dry prior to January 1915.**

Average Flow in Second-Feet

<u>Daily:</u>	Max.	17,000,	June 20, 1905.	Min. frequently dry prior to Jan. 1915.
<u>Monthly:</u>	Max.	5,030,	May 1942.	Min. frequently dry prior to Jan. 1915.
<u>Yearly:</u>	Max.	2,140,	1905.	Min. 42.4 1902.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	# 210	# 231	146	41.7	58.1	51.1	48.6	22.0	162	47.2	96.9	141
2	# 212	# 220	*129	37.3	46.7	52.8	39.3	20.6	113	55.7	115	139
3	# 214	# 218	*105	40.6	47.7	47.7	40.0	62.6	72.9	53.6	111	143
4	# 220	# 216	* 79.1	78.9	46.8	44.2	40.7	45.7	55.2	57.5	106	146
5	# 220	# 225	91.8	57.1	38.4	50.6	34.9	29.2	42.1	66.7	89.6	152
6	# 220	# 226	94.3	42.0	55.0	60.7	33.1	23.2	47.0	63.0	78.6	155
7	# 227	# 215	131	57.4	55.7	48.6	33.4	29.1	52.6	66.0	93.9	136
8	# 235	# 217	* 99.6	66.8	69.1	44.0	34.9	27.9	78.0	56.3	122	133
9	# 242	# 228	* 75.6	50.1	66.3	50.4	34.1	26.6	93.5	52.1	123	132
10	# 249	# 220	* 81.5	56.1	158	45.8	32.0	25.5	152	49.4	127	137
11	# 257	# 213	69.9	65.5	262	57.4	29.4	41.0	87.4	54.5	124	137
12	# 264	# 204	* 50.5	74.4	264	55.0	25.0	36.7	97.8	57.4	113	129
13	# 271	# 212	43.0	50.5	179	50.4	27.8	30.8	69.3	54.4	113	135
14	# 279	# 212	39.6	75.3	200	46.5	25.1	45.7	116	138	128	133
15	# 285	# 214	38.5	114	163	58.2	36.5	40.1	111	109	124	147
16	# 281	# 214	44.3	105	128	65.1	22.7	44.5	167	86.9	133	129
17	# 276	# 200	63.0	112	75.6	77.6	20.8	61.1	156	91.0	152	132
18	# 272	# 194	42.5	90.0	77.7	101	27.0	865	141	92.5	152	143
19	# 267	# 185	50.9	74.6	95.9	145	23.0	1,570	96.2	118	149	119
20	# 263	# 176	142	183	90.7	375	27.9	538	156	120	144	111
21	# 258	# 179	67.2	136	58.3	425	33.1	365	111	132	131	110
22	# 254	# 182	37.3	85.4	52.8	178	32.5	327	112	119	134	123
23	# 249	# 182	31.7	63.6	57.4	196	36.2	373	88.6	120	149	104
24	# 245	# 183	34.7	53.4	54.8	107	35.6	617	74.0	120	140	110
25	# 250	# 174	28.1	41.1	87.8	73.4	39.3	1,230	60.6	107	140	106
26	# 245	# 162	42.3	52.8	84.6	58.8	36.6	674	48.9	107	142	95.8
27	# 244	# 160	33.0	80.2	72.5	52.8	33.9	372	55.9	113	134	95.9
28	# 243	# 160	29.8	89.3	55.7	51.1	32.2	232	49.4	113	136	95.2
29	# 242		36.0	97.7	68.7	55.6	32.8	185	58.4	124	141	85.4
30	# 241		36.9	94.2	55.7	67.6	30.8	203	49.6	122	141	90.1
31	# 240		55.3		50.9	29.5		171		109		87.6
Sum		5,622	2,266.0		2,792.4	8,334.3	2,775.2		3,832			
#7,675		2,049.4		2,876.9	1,008.7	2,764.4	3,783					

Current Year 1947**Period 1944-1947****Acre-Feet**

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1947	
	High	Low	Day	Day			High	Low	Normal		
Jan.			15	# 285	1	# 210	# 248	# 15,200	20,900	5,370	16,096
Feb.			1	# 231	# 27	# 160	# 201	# 11,200	14,114	3,510	16,218
Mar.	2.70	1.65	20	214	28	22.5	66.1	11,932	38,900	1,090	13,151
Apr.	3.04	1.71	20	298	24	33.3	75.5	4,490	15,084	77,000	16,938
May	3.14	1.74	11	357	7	32.6	92.8	5,710	27,504	309,000	880
June	3.18	1.77	21	582	12	36.4	93.1	5,540	24,752	240,000	3,630
July	2.53	1.52	15	174	16	17.6	32.5	2,000	24,057	140,000	2,000
Aug.	6.05	1.53	19	3,980	3	15.9	269	16,500	31,134	* 127,000	2,490
Sept.	3.06	1.82	10	411	27	40.3	92.1	5,480	34,983	147,000	5,480
Oct.	3.56	1.85	14	444	3	43.6	89.5	5,500	25,558	66,500	4,520
Nov.	2.66	2.09	22	164	6	68.4	126	7,500	15,834	24,500	4,990
Dec.	2.72	2.24	6	180	31	72.6	124	7,600	16,672	31,000	5,640
Yearly	6.05	1.52		3,980		15.9	125	90,780	255,184	1,270,400	90,780
											308,969

* Estimated * Partly estimated ** Elephant Butte Reservoir closed January 1915 † And other days
† Mean daily # Including estimated records @ Estimated from peak flow at El Paso and Upper Presidio

RIO GRANDE AT UPPER PRESIDIO STATION

DESCRIPTION: Water-stage recorder, cable with sit-down cable car equipped for winch and heavy weights, located 7.8 river miles above the confluence of the Rio 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. Zero of gage is 2,579.82 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 30 meter measurements during the year. Computations by shifting channel methods. 1947 records fair. Records available: May 1900 to March 1914 and August 1923 to December 1947.

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

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. @ 15,200 sec.-ft. on June 12, 1912. Datum of gage in 1912 is unknown. Min., sometimes dry. 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 1923-1947, inclusive.

Average Flow in Second-Feet

Daily @:	Mar.	15,200,	June 12, 1912.	Min.	sometimes dry.
Monthly:	Mar.	10,150,	June 1905.	Min.	sometimes dry.
Yearly:	Max.	1,970,	1907.	Min.	75.0 1934.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	220	215	146	11.1	2.5	8.6	" .5	0	75.2	2.5	" 0	50.1
2	218	207	122	10.5	2.1	7.6	0	0	48.2	2.2	" 0	46.4
3	213	196	123	10.3	2.3	7.0	0	0	33.5	1.8	" 0	59.5
4	213	194	121	10.3	.8	6.1	0	0	24.6	1.5	" 0	70.8
5	216	193	123	9.6	2.7	5.6	0	0	19.9	1.4	" 0	58.0
6	232	202	115	9.1	1.8	4.8	0	0	9.8	1.4	" 0	61.7
7	231	204	111	9.2	* .6	4.4	0	0	5.3	1.3	" 0	67.6
8	230	193	106	8.8	3.4	4.0	0	0	4.8	1.2	" 0	64.1
9	235	195	103	8.6	12.7	4.0	0	0	146	1.1	" 0	62.9
10	260	207	105	8.1	530	4.0	0	0	1,350	1.1	" .1	67.7
11	277	200	99.8	7.9	767	4.0	0	0	975	1.0	" .1	58.5
12	276	193	90.7	7.5	412	4.0	0	0	330	1.0	" .1	60.6
13	274	185	78.0	7.3	189	4.0	0	0	220	1.0	" .1	70.1
14	272	194	69.0	7.1	147	4.0	0	0	119	271	" .2	71.9
15	270	194	61.9	6.9	125	4.0	0	0	83.7	* 4.5	" .2	75.2
16	262	186	59.7	6.0	95.7	4.0	0	0	54.9	* 1:3	" .2	72.0
17	258	186	57.6	5.9	61.7	3.0	0	1.2	37.0	* 1.3	" .8	72.6
18	252	184	45.6	5.4	49.0	3.0	" 1.0	2.0	27.5	* 1.1	4.1	70.6
19	254	178	35.5	5.2	47.2	2.0	" 5.1	0	20.2	" 1.0	6.4	65.0
20	236	170	28.1	5.0	40.1	2.0	0	0	10.0	" .9	9.1	68.0
21	242	161	25.8	5.2	31.2	2.0	0	51.2	44.3	" .8	6.2	67.0
22	249	165	21.6	5.2	26.1	2.0	0	354	30.5	" .8	16.3	69.8
23	242	168	20.1	5.0	21.9	2.0	0	211	20.8	" .7	24.4	66.2
24	237	169	20.6	4.2	20.4	* 4.6	0	* 191	16.6	" .6	25.7	67.6
25	239	171	20.1	3.4	18.2	3.0	0	* 268	12.3	" .5	25.7	64.2
26	240	162	15.7	4.4	16.4	2.0	0	* 608	8.0	" .4	21.9	58.5
27	235	149	14.6	4.4	14.5	1.0	0	* 968	3.8	" .3	28.3	56.5
28	230	150	13.5	4.2	12.0	1.0	0	* 483	3.5	" .3	37.2	54.4
29	226		13.4	4.0	10.8	1.0	0	* 245	3.1	" .2	33.6	53.3
30	219		11.4	4.2	10.1	1.0	0	* 168	2.8	" .1	37.8	54.4
31	223		11.2		9.4		0	113	0			53.4
Sum			5,171	204.0	*109.7			*3,663.4	304.3			1,958.6
7,481			1,988.9	2,683.6	* 6.6			*3,740.3	278.5			

Current Year 1947							Period 1932-1947			Acre-Feet	
Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1947	
	High	Low	Day	High	Day		Normal	Maximum	Minimum		
Jan.	.58	.28	14	279	5	210	241	14,800	12,989	24,400	644 16,305
Feb.	.49	-.08	10	250	28	139	185	10,300	12,522	40,800	1,420 14,991
Mar.	-.01	-1.17	1	154	31	10.8	64.2	3,940	10,316	39,100	285 12,107
Apr.	-1.16	-1.45	1	11.5	24	1.8	6.8	405	8,521	41,600	0 9,058
May	4.12	-1.57	11	1,430	7	.5	86.6	5,320	20,384	240,000	* 218 31,818
June	-1.34		1	8.8	428	1.0	* 3.7	* 218	19,407	216,000	* 218 31,558
July	-1.17		19	11.7	2	0	* .2	* 13.1	25,735	156,000	* 13.1 31,171
Aug.	3.78		27	1,320	1	0	* 118	* 7,270	33,770	133,000	* 128 32,448
Sept.	4.81	-1.38	10	1,690	30	2.8	* 125	* 7,420	37,680	* 151,000	602 39,192
Oct.	3.70		14	1,260	31	0	9.8	604	32,581	105,000	0 36,483
Nov.	-.64		30	47.6	1	0	9.3	552	15,544	34,500	0 15,675
Dec.	-.43	-.71	4	79.0	2	43.4	63.2	3,880	15,146	30,900	374 16,822
Yearly	4.81			1,690		0	75.6	* 54,722.1	244,595	1,176,700	54,315 293,748

* Estimated * Partly estimated † And other days \$ Since daily records began in 1900

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 Rio 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 upon 166 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: January 1, 1945 to December 31, 1947.

REMARKS: Construction of this station was completed in January 1945 for the purpose of determining discharges at this point where a storage reservoir is under consideration. Gage readings began January 1, 1945, measurements began on January 26, and on January 28 a water-stage recorder was installed. The flow of this stream is modified by irrigation diversions and drainage returns and is also strongly affected by the operation of La Rosetilla, La Colina and La Boquilla reservoirs situated 139, 199 and 206 river miles respectively, above this station.

EXTREME FLOWS: The greatest recorded flow for the period 1945-1947 was 34,360 second-feet on October 9, 1945, with a gage height of 15.85 feet. The lowest recorded flow was 53.3 second-feet on September 17, 1945, with a gage height of 2.00 feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	650	583	491	149	128	79.8	167	189	6,850	565	724	1,261
2	618	957	720	143	127	101	139	149	4,770	840	717	901
3	819	1,300	650	143	145	103	236	123	5,510	523	696	1,130
4	597	947	636	143	168	94.6	242	125	3,220	403	893	848
5	879	933	434	123	148	129	237	145	2,320	381	823	752
6	1,090	971	611	141	129	131	290	367	2,320	403	766	901
7	897	834	579	134	182	187	256	840	2,260	346	886	855
8	696	1,020	1,63	117	186	123	182	1,180	2,500	367	961	872
9	943	1,080	629	189	381	155	140	830	6,670	519	982	826
10	865	1,250	643	176	883	158	135	1,070	3,190	403	1,024	597
11	664	1,150	544	153	327	120	124	1,090	3,810	459	971	678
12	1,010	978	417	154	213	120	102	918	4,200	374	1,102	692
13	1,020	1,020	487	121	171	121	110	579	5,330	618	996	547
14	883	1,010	710	109	142	112	280	444	4,770	614	1,035	653
15	706	1,230	622	106	117	509	214	766	3,990	406	1,010	614
16	898	904	830	108	110	279	124	975	3,960	388	1,063	780
17	809	1,260	982	105	128	268	180	717	3,810	403	1,021	639
18	1,090	858	1,030	108	127	696	139	1,210	3,640	357	1,058	625
19	989	579	886	192	166	706	106	1,070	3,230	299	1,074	706
20	1,100	689	770	244	133	561	463	1,420	3,100	283	1,035	544
21	950	519	434	161	109	516	286	2,960	2,590	551	1,229	759
22	802	636	335	136	96.8	350	197	3,520	2,360	392	1,303	936
23	992	798	301	124	143	420	189	3,160	1,960	420	1,328	805
24	1,110	890	519	108	209	343	184	2,620	1,370	392	1,324	837
25	1,180	781	399	106	151	285	252	4,910	1,570	643	1,105	802
26	1,220	459	281	114	118	202	197	4,910	1,210	636	1,158	724
27	1,350	558	229	192	94.3	161	164	5,160	1,420	703	1,038	763
28	886	760	273	174	93.2	204	137	5,400	904	480	876	456
29	1,060	292	142	93.9	194	124	8,120	901	403	1,091	374	526
30	840	212	129	90.8	159	110	7,520	777	367	1,127	572	572
31	586	170			86.5	129			9,180	616		
Sum			24,954	4,244	7,587.4		71,647	14,584				22,975
28,139			16,579	5,396.5	5,835		92,512	30,396				

Current Year 1947 Period 1945-1947

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	Day			Average	Maximum	Minimum
Jan.	5.09	2.79	27	1,740	2	477	908	55,810	50,010
Feb.	5.09	2.76	3	1,810	27	434	891	49,500	49,500
Mar.	4.69	1.94	18	1,370	31	154	535	32,880	34,930
Apr.	2.53	1.54	19	334	26	93.2	141	8,420	17,370
May	5.54	1.54	10	1,670	31	80.9	174	10,700	12,060
June	4.86	1.51	23	1,510	1	75.9	253	15,050	18,430
July	5.31	1.54	14	1,990	13	84.4	188	11,570	18,760
Aug.	9.58	1.74	31	9,500	3	112	2,310	142,100	178,500
Sept.	9.97	3.22	9	11,720	30	540	3,080	183,500	134,650
Oct.	4.40	2.26	1	1,130	20	275	470	28,930	118,210
Nov.	5.02	2.99	23	1,820	2	526	1,010	60,290	55,620
Dec.	4.95	2.49	1	1,800	29	345	741	45,570	34,990
Yearly	9.97	1.51		11,720		75.9	890	644,320	661,590
								703,660	637,530

RIO CONCHOS NEAR OJINAGA, CHIHUAHUA

DESCRIPTION: The Rio 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 upon discharge records of the Rio Grande at Upper Presidio and Lower Presidio stations and estimated irrigation diversions and arroyo inflow between these two stations. 1947 records good. Records available: May 1900 through 1914 and 1924 through 1947.

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 only. The daily river flow may be modified by these reservoirs, but except for evaporation, the monthly flow is not. Power generation facilities #: La Boquilla 14,647 kw., La Colina 3,620 kw., La Rosetilla 5,150 kw.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 162,000 second-feet on September 11, 1904. Min., 3.0 second-feet on May 14, 1904. The second lowest recorded flow was 19.0 second-feet on August 18, 1937.

	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. #:	3,720,		1914.	Min. 348,	1922.	

Month	Current Year 1947				Period 1924-1947			Acre-Feet	
	Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet				
	Day	High			Normal	Maximum	Minimum	Normal 1938-1947	Average 1945-1947
Jan.	28	1,510	1	466	920	56,600	61,267	147,000	20,300
Feb.	4	1,460	28	478	865	148,000	50,992	87,700	29,100
Mar.	19	1,150	31	227	548	35,700	45,683	80,800	20,900
Apr.	1	237	20	86.0	134	8,000	33,665	79,700	5,000
May	10	2,350	31	73.7	228	14,000	40,057	148,000	3,950
June	23	2,550	2	61.8	216	12,800	44,781	91,900	8,720
July	21	371	20	85.4	145	8,890	93,800	502,000	8,890
Aug.	31	9,450	6	66.4	2,000	123,000	136,271	601,000	11,300
Sept.	10	9,030	30	815	3,170	188,000	288,407	1,173,000	6,770
Oct.	14	3,420	21	333	540	33,200	175,642	798,000	33,200
Nov.	23	1,540	1	512	1,010	59,900	64,304	110,000	29,000
Dec.	2	1,430	30	448	839	50,400	56,196	97,700	22,200
Yearly		9,030		61.8	879	636,490	1,091,065	2,431,850	509,600
									1,168,793
									679,794

Data from June 1934 issue of "Irrigación en Mexico" * Beginning with 1900

RIO GRANDE AT LOWER PRESIDIO STATION

DESCRIPTION: Water-stage recorder, 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 Rio Conchos with the Rio 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 upon 49 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: May 1900 to July 1915 and August 1923 to December 1947.

RESERVOIRS: 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					
Monthly #:	Max.	24,870	Sept.	1904.	Min.	11.0					
Yearly #:	Max.	4,870,		1906.	Min.	756,					

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	778	859	808	230	331	81.9	154	80.4	9,090	846	608	1,160
2	854	829	635	192	117	80.2	168	90.1	5,130	845	669	1,270
3	931	1,200	813	177	106	74.2	130	107	4,000	796	664	1,080
4	965	1,440	769	163	104	81.7	142	90.1	3,390	589.	702	1,310
5	832	1,040	737	154	122	82.5	213	70.8	2,880	498	865	988
6	1,140	1,130	621	155	147	83.2	165	68.4	2,240	461	823	950
7	1,410	1,120	639	158	128	157	224	258	2,290	445	803	1,090
8	1,090	978	668	153	293	176	225	674	2,250	394	895	975
9	977	1,240	568	133	282	125	174	918	4,550	393	986	1,000
10	1,250	1,230	697	123	2,070	110	130	664	6,740	485	1,000	900
11	1,100	1,560	687	162	1,520	110	112	926	3,550	417	1,060	748
12	1,020	1,280	630	140	943	96.8	98.3	894	3,780	446	987	825
13	1,270	1,120	528	133	1469	84.4	94.5	700	4,640	482	1,110	836
14	1,340	1,170	554	139	329	84.2	104	487	5,240	1,670	968	728
15	1,110	1,150	683	131	271	91.2	150	1,400	4,170	650	985	806
16	1,080	1,340	677	120	292	312	114	609	3,990	466	1,010	817
17	1,090	1,060	891	116	232	263	126	832	3,810	443	1,100	841
18	1,080	1,390	978	110	211	259	99.8	655	3,600	441	1,110	783
19	1,400	954	1,010	95.9	214	479	123	1,130	3,380	409	1,100	781
20	1,200	796	907	93.9	220	504	96.9	918	3,050	377	1,120	816
21	1,350	858	751	198	209	431	243	1,860	2,620	346	1,120	710
22	1,170	741	538	157	182	400	215	3,520	2,580	546	1,310	886
23	1,170	806	423	130	148	562	165	3,440	2,140	426	1,350	1,020
24	1,250	975	375	117	130	502	129	2,940	1,870	447	1,330	853
25	1,320	1,040	491	114	147	340	133	4,040	1,530	469	1,320	977
26	1,440	889	431	106	166	283	164	5,380	1,490	618	1,130	851
27	1,440	662	346	106	145	206	149	4,780	1,300	656	1,170	853
28	1,530	729	296	129	125	165	136	5,970	1,360	631	1,080	812
29	1,100	268	157	110	200	116	5,910	956	507	930	609	
30	1,300	301	148	97.9	182	107	8,170	1,030	450	1,160	524	
31	1,030	262	87.4	87.4		92.6	8,260		401		614	
Sum		29,386	4,240.8	6,586.3	65,839.8	17,050						27,353
36,017		18,982	9,748.3	4,493.1	98,746	30,465						

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total	Period 1924-1947			Acre-Feet
	High		Low	Day	Day			Normal	Maximum	Minimum	
	High	Low	Day	Day	Day	Day	Acre-Feet	1938-1947	1938-1947	1938-1947	
Jan.	3.54	2.42	28	1,740	1	686	1,160	71,400	74,250	164,000	30,400
Feb.	3.46	2.28	4	1,650	28	619	1,050	58,300	63,504	99,700	33,900
Mar.	3.02	1.48	19	1,190	31	238	612	37,700	55,975	89,400	21,200
Apr.	1.50	1.10	1	248	20	91.0	141	8,410	41,582	84,100	4,460
May	4.57	1.03	10	3,140	31	82.6	318	19,300	60,132	270,000	3,660
June	4.16	.97	23	2,550	2	69.5	220	13,100	63,894	267,000	9,250
July	1.82	1.07	21	371	20	86.8	145	8,910	118,659	564,000	8,910
Aug.	7.64	.99	31	9,550	6	66.4	2,120	131,000	169,633	675,000	18,400
Sept.	# 7.99	# 2.52	10	# 10,400	30	# 818	5,290	196,000	326,120	1,324,000	7,370
Oct.	5.51	1.64	14	4,680	21	334	550	33,800	208,229	864,000	33,800
Nov.	3.36	2.00	24	1,560	1	512	1,020	60,400	79,858	141,000	37,800
Dec.	3.31	2.03	2	1,480	30	502	882	54,300	71,333	116,000	31,400
Yearly #	7.99	.97		# 10,400	66.4	957	692,620	1,333,169	3,466,700	662,700	1,460,459

Estimated * Beginning with 1900

ALAMITO CREEK NEAR PRESIDIO, TEXAS

DESCRIPTION: Water-stage recorder, about 1,800 feet above the confluence with the Rio Grande, and six miles below Presidio, Texas, and Ojinaga, Chihuahua. This creek enters the Rio Grande .4 river mile below the lower end of the Presidio Valley and 306.9 river miles below the American Dam at El Paso, Texas. Zero of the gage is 2,541.42 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 1 meter measurement during the year and a rating curve, the high points of which are determined by slope-area calculations, and the medium and low points of which are determined by meter measurements: also, upon numerous estimates by the hydrographer at low flow. Computations by shifting channel methods. 1947 records fair. Records available: January 1, 1932, to December 31, 1947.

REMARKS: The flow of this spring-fed creek is modified by a small irrigation reservoir (San Esteban) 10.5 miles south of Marfa and by irrigation diversions for about 805 acres of land below the reservoir. The low flow is steady, being from springs. The high flow is erratic, being from storms. 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-feet 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. 1955.
Yearly:	Max.	55.9	1941.	Min.	8.8	1934.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
2	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
3	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	17.6
4	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 5.7
5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
6	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 8.9	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
7	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 8.3	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
8	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
9	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
10	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 5.0	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
11	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 14.0	# 3.5	# 3.5	# 3.5	12.5	# 3.5	# 3.5
12	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	70.6	# 3.5	# 3.5
13	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	59.3	# 3.5	# 3.5
14	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 3.6	164	# 3.5	82.0	# 3.5
15	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 7.0	1,620	# 3.5	# 3.5	# 3.5
16	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 76.0	# 3.5	# 3.5	# 3.5
17	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	4.7	# 3.5	# 3.5	# 3.5
18	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	4.0	# 3.5	# 3.5	# 3.5
19	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	* 8.3	3.5	# 3.5	# 3.5
20	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	79.3	# 3.5	# 3.5	# 3.5
21	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
22	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
23	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
24	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
25	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5
26	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	50.7	# 3.5	# 3.5	# 3.5
27	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	119	# 3.5	# 3.5	# 3.5
28	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	59.8	# 3.5	# 3.5	# 3.5
29	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	39.6	# 3.5	# 3.5	# 3.5
30	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	3.8	# 3.5	# 3.5	# 3.5
31	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	# 3.5	3.5	# 3.5	# 3.5	# 3.5
Sum	\$98.0	\$105.0	\$115.7	\$2,290.9	* 187.0	\$124.8						
	\$108.5	\$108.5	\$125.7	\$116.9	* 399.6	\$105.0						

Month	Current Year 1947			Total Acre-Feet	Period 1932-1947			Acre-Feet Normal 1938-1947	
	Extreme Gage Feet		High Day	Extreme Second-Feet		Average Second Foot	Acre-Feet		
	High	Low		Day	High		Normal		
Jan.	\$ 1	# 1	# 3.5	# 1	# 3.5	# 3.5	215	206	
Feb.	\$ 1	# 1	# 3.5	# 1	# 3.5	# 3.5	194	189	
Mar.	\$ 1	# 1	# 3.5	# 1	# 3.5	# 3.5	215	204	
Apr.	\$ 1	# 1	# 3.5	# 1	# 3.5	# 3.5	208	244	
May	3.57	11	51.7	# 1	# 3.5	# 1.1	249	1,494	
June	3.95	6	182	# 1	# 3.5	# 3.5	229	8,520	
July	3.62	19	62.7	# 1	# 3.5	# 3.8	232	1,911	
Aug.	6.30	15	8,320	# 1	# 3.5	* 73.9	* 4,540	6,360	
Sept.	4.24	12	400	# 1	# 3.5	* 13.3	* 793	2,814	
Oct.	4.36	14	538	# 1	# 3.5	* 6.0	* 371	6,650	
Nov.	\$ 1	3	3.5	# 1	# 3.5	# 4.0	208	16,330	
Dec.	3.65	3	69.8	# 1	# 3.5	# 4.0	248	4,108	
Yearly	6.30		8,320		# 3.5	* 10.6	* 7,702	19,200	
							18,126	19,600	
							40,444	40,444	
							6,397	6,397	
								15,546	

* And other days # Estimated * Partly estimated

TERLINGUA CREEK NEAR TERLINGUA, TEXAS

DESCRIPTION: Water-stage recorder located about 12 miles south of Terlingua, Texas, 2.4 miles above the confluence with the Rio Grande at the lower end of Santa Helena Canyon. Zero of gage is 2,192.01 ± .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 upon 46 meter measurements during the year at low flow, and the 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. 1947 records poor. Records available: January 1, 1932, to December 31, 1947.

REMARKS: The flow of this spring-fed creek is modified by irrigation diversions above the station. The low flow is steady, being from springs; the high flows are erratic, being from storms. On September 2, 1943, the "A" frame at this station on the east side of the creek was washed away and has not been replaced. The cable anchorage in the rock hill and the gage well on the west side were undamaged.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max. 47,000 second-feet on June 2, 1937, with a gage height of 19.50 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. 1937.
Yearly:	Max.	146, 1937.	Min.	5.5	1943.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.6	2.8	3.4	2.8	2.5	233	3.6	3.7	3.2	2.5	3.0
2	3.5	3.5	2.9	3.5	2.7	2.4	28.0	3.4	3.3	2.9	2.5	3.0
3	3.6	3.4	2.9	3.5	2.7	2.3	8.8	3.2	3.0	2.9	2.5	3.0
4	3.7	3.3	2.9	3.4	2.7	2.2	7.9	3.0	2.7	2.8	2.6	3.0
5	3.8	3.2	3.0	3.1	2.7	2.1	7.0	2.9	2.8	2.8	2.8	3.0
6	3.9	3.2	3.1	3.3	2.8	2.2	6.0	2.8	3.0	2.8	2.9	3.0
7	3.8	3.1	3.2	3.3	2.8	2.4	5.1	2.6	3.2	3.0	3.0	3.1
8	3.7	3.0	3.3	3.2	2.8	2.6	4.2	2.5	3.3	2.7	3.1	3.1
9	3.6	2.9	3.4	3.2	2.8	2.7	4.2	2.4	3.6	3.2	3.2	3.1
10	3.6	2.9	3.6	3.2	164	2.8	4.2	2.3	3.9	2.6	3.4	3.1
11	3.5	2.8	3.7	3.3	138	3.0	4.2	2.3	4.2	2.6	3.5	3.1
12	3.4	2.7	3.8	3.4	86.0	3.2	111	2.3	4.6	2.6	3.5	3.1
13	3.4	2.7	3.9	3.4	25.0	3.3	4.2	2.3	4.9	2.5	3.4	3.2
14	3.3	2.7	4.0	3.4	4.0	3.0	4.2	17.2	5.2	2.5	3.4	3.2
15	3.2	2.7	3.9	3.5	4.0	2.8	4.2	714	5.5	3.4	3.2	3.1
16	3.3	2.7	3.7	3.6	3.5	2.6	4.2	223	5.1	2.5	3.3	3.2
17	3.1	2.7	3.6	3.6	3.5	2.3	4.2	10.2	4.7	2.5	3.3	3.2
18	3.6	2.7	3.5	3.5	3.5	3.3	4.2	16.7	4.3	2.5	3.3	3.2
19	3.7	2.7	3.3	3.5	3.0	4.4	4.2	16.7	3.9	2.5	3.3	3.2
20	3.8	2.7	3.2	3.4	3.0	5.4	4.2	16.7	3.5	2.5	3.2	3.1
21	3.9	2.7	3.0	3.3	3.0	6.4	4.3	16.7	3.6	2.5	3.2	3.1
22	4.0	2.7	2.9	3.2	110	7.0	4.3	16.7	3.8	2.4	3.2	3.1
23	4.2	2.7	2.8	3.2	26.0	156	4.3	16.7	4.0	2.4	3.1	3.1
24	4.3	2.8	2.6	3.1	3.2	103	4.3	16.7	4.1	2.4	3.1	3.1
25	4.4	2.8	2.5	3.0	3.1	52.0	4.3	166	4.2	2.4	3.1	3.1
26	4.3	2.8	2.6	3.0	3.0	9.0	219	368	4.4	2.4	3.1	3.0
27	4.2	2.8	3.0	3.0	3.0	8.3	3.8	35.0	4.2	2.4	3.1	3.0
28	4.1	2.8	2.9	2.9	2.9	8.4	3.8	29.7	3.9	2.4	3.1	2.9
29	4.0	2.8	3.0	2.8	2.8	8.5	3.8	22.0	3.6	2.4	3.0	2.9
30	3.8	2.8	3.1	2.8	2.7	203	3.8	15.0	3.4	2.4	3.0	2.8
31	3.7	2.8	3.2	2.6	2.6	3.8	8.0	8.0	2.5	2.5	2.8	2.8
Sum		81.3	98.3	619.1			1,760.6		79.8		95.0	
		116.1	99.1	624.6			716.8		117.6		93.1	

Current Year 1947

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total	Period 1938-1947			Acre-Feet Normal 1938-1947	
	High	Low	Day	Day			Normal	Maximum	Minimum		
	High	Low	Day	Day	Acre-Feet	Acres-Feet	Normal	Maximum	Minimum		
Jan.	25	4.4	15	3.2	3.8	230	204	743	82.7	237	
Feb.	1	3.6	12	2.7	2.9	161	138	267	73.4	144	
Mar.	14	4.0	25	2.5	3.2	197	180	489	72.4	181	
Apr.	416	3.6	429	2.8	3.5	195	1,240	15,500	55.1	1,861	
May	3.90	10	745	31	2.6	20.1	5,258	* 26,000	117	3,421	
June	5.72	30	1,880	5	2.1	20.6	1,230	7,387	54,800	59.5	3,628
July	4.28	12	930	427	3.8	* 23.1	* 1,420	5,490	26,800	621	6,399
Aug.	5.00	15	1,340	40	2.3	* 56.8	* 3,490	4,231	* 26,680	123	2,550
Sept.	15	5.5	4	* 2.7	3.9	233	6,559	24,600	293	2,041	
Oct.	1	3.2	422	2.4	2.6	158	2,367	8,100	50.8	1,407	
Nov.	411	3.5	1	2.5	3.1	185	403	* 2,980	64.9	1,444	
Dec.	413	3.2	30	2.8	3.1	188	376	3,080	90.0	213	
Yearly	5.72		1,880		2.1	12.3	* 8,927	33,813	105,807	3,958.0	22,526

* And other days # Estimated * Partly estimated

RIO GRANDE AT JOHNSON RANCH, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car with 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 according to adjustment of 1943, U.S.C. & G.S. datum.

RECORDS: Based upon 48 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: April 1936 to December 1947.

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. Also an estimated 97,000 second-feet on October 3, 1932, with a stage of 24.6 feet. Min. 23.1 second-feet on June 6, 1938 with a gage height of .84 feet.

		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. 1,020, 1940.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	945	1,260	707	301	76.0	110	965	87.0	8,230	934	453	1,010
2	1,060	970	813	284	82.0	105	302	72.1	7,480	1,020	435	1,130
3	1,020	917	763	246	94.1	95.8	218	69.6	5,380	820	588	1,250
4	981	1,000	738	209	91.2	89.8	134	150	4,130	913	655	1,170
5	944	1,340	796	184	80.5	83.0	107	67.2	3,480	752	626	1,250
6	999	1,260	796	172	75.3	76.2	98.3	47.7	2,900	659	664	1,130
7	1,190	1,020	715	162	67.3	113	86.5	49.8	2,170	592	791	913
8	1,300	1,170	684	155	70.5	250	116	47.9	2,280	549	743	983
9	1,270	1,090	676	152	190	98.1	130	44.1	2,230	514	752	1,030
10	1,050	1,040	661	132	712	70.9	137	331	12,700	462	836	930
11	1,170	1,230	587	123	2,010	90.6	143	685	7,250	455	879	973
12	1,260	1,320	715	112	1,830	81.3	193	587	5,450	511	933	832
13	1,090	1,290	638	99.6	1,310	100	318	744	4,410	879	934	806
14	1,190	1,190	601	102	906	63.6	175	1,040	4,570	516	961	856
15	1,310	1,180	523	109	530	58.0	106	3,010	4,840	1,360	953	804
16	1,320	1,190	587	117	382	55.7	112	5,420	3,890	815	909	795
17	1,160	1,310	623	114	302	54.5	81.8	1,370	3,800	648	937	786
18	1,260	1,210	683	111	273	211	65.3	976	3,770	512	1,000	878
19	1,110	1,270	882	101	236	252	93.1	810	3,660	479	1,020	843
20	1,300	1,210	926	97.7	209	256	72.5	803	3,450	472	1,010	792
21	1,350	930	917	94.5	192	277	69.5	1,040	3,170	440	1,030	825
22	1,320	914	856	94.7	189	374	97.1	1,340	2,670	404	1,030	774
23	1,340	842	683	94.9	210	436	73.7	3,720	2,370	374	1,150	798
24	1,160	842	537	98.9	185	1,380	97.4	3,400	2,170	510	1,240	891
25	1,280	858	463	110	184	886	686	3,460	1,870	446	1,260	980
26	1,360	993	407	96.8	158	457	228	6,180	1,480	447	1,260	871
27	1,390	1,020	457	87.4	140	354	120	6,430	1,440	485	1,130	975
28	1,480	831	433	82.5	145	355	88.2	5,510	1,200	604	1,110	820
29	1,590	372	80.3	139	236	78.6	54.40	1,270	967	1,070	787	875
30	1,360	327	78.2	128	180	89.2	6,280	1,090	713	1,020	744	615
31	1,240	306	119				131	6,870	516			
Sum		30,697	4,001.5	7,247.5	66,081.4	19,768	28,309					
37,799		19,872	11,313.9	5,412.2	114,800	27,379						

Month	Current Year 1947			Period 1936-1947 #			Acre-Feet Normal 1938-1947	
	Extreme Gage Fee		Extreme Second-Feet		Average Second- Fee	Total		
	High	Low	Day	Day	Low	Acre-Feet		
Jan.	2.73	# 1.80	29	1,720	1	789	1,220	75,000
Feb.	2.52	1.75	5	1,480	28	740	1,100	60,900
Mar.	2.04	1.07	21	990	31	291	641	39,400
Apr.	1.11	.55	1	312	30	75.4	39,400	49,655
May	3.46	.49	11	2,720	8	62.6	365	22,400
June	3.53	.37	24	2,810	17	30.1	242	14,400
July	4.09	.55	1	3,740	23	63.2	175	10,700
Aug.	7.42	.45	16	11,900	9	42.2	2,130	131,000
Sept.	10.30	* 1.94	10	20,700	30	* 926	3,830	228,000
Oct.	3.05	1.18	13	2,150	23	365	638	39,200
Nov.	2.37	1.24	25	1,350	2	405	913	54,500
Dec.	2.35	1.56	5	1,320	31	578	913	56,200
Yearly	10.30	.37		20,700		30.1	1,020	739,440
							1,469,011	#3,461,400
							739,440	1,549,407

Beginning April 1, 1936 * Partly estimated # For the period 1937-1947 # Estimated

SPECIAL STATIONS IN BIG BEND AREA

During a part of the year 1947 four special gaging stations on the Rio Grande between Johnson Ranch and Langtry 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:

BOQUILLAS STATION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, located four miles below the mouth of Tornillo Creek, a quarter of a mile east of Boquillas, Brewster County, Texas, and 447.7 river miles below the American Dam at El Paso, Texas. Elevation of the zero of the gage is 1,802.73 feet above mean sea level, U.S.G.S. datum. During 1947, eleven current meter measurements were made by the U.S. Section by wading at this station.

MARAVILLAS STATION: Water-stage recorder located .4 mile above the mouth of Maravillas Creek and 489.2 river miles below the American Dam at El Paso, Texas. During 1947, eleven current meter measurements were made by the U. S. Section by wading at this station.

JONES RANCH STATION: Water-stage recorder located about 750 feet above Jones Ranch Pump and 516.3 river miles below the American Dam at El Paso, Texas. During 1947, 19 current meter measurements were made by wading at this station, eleven by the U. S. Section and eight by the Mexican Section.

AGUA VERDE STATION: Water-stage recorder and cable with stand-up cable car equipped for winch and heavy weights located at the Agua Verde Dam Site and 571.7 river miles below the American Dam at El Paso, Texas. Elevation of the zero of the gage is 1,241.07 feet, above mean sea level, U.S.C. & G.S. datum. During 1947, 99 current meter measurements were made by the Mexican Section at this station. Some of these measurements were made from the cable and others by wading.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Boquillas Station			Maravillas Station		Jones Ranch Station			Agua Verde Station							
Day	April	May	April	May	April	May	June	April	May	June	July	August	Sept.	Dec.	
1		* 141		137		237	274	650	317	340	657	307	6,850		
2		* 134		128		226	295	607	305	338	572	335	7,170		
3		* 128		129		227	264	586	296	346	879	374	7,590		
4		132		127		222	254	551	287	325	752	346	5,540		
5		140		121		199	249	533	289	315	537	325	4,410		
6		136		123		199	249	477	280	305	445	319	3,670		
7		131		121		208	239	463	278	315	378	291	3,400		
8		131		115		219	226	445	286	305	347	310			
9				124		260	219	427	293	284	319	287			
10						224	224	410	* 1,110	273	308	273			
11								392	* 812	287	327	268			
12								374	* 1,290	374	290	251			
13		184						360	1,660	487	367	293			
14		184						353	1,800	438	350	551			
15		177						349	1,680	331	360	678			
16		199						349	1,280	345	445	2,190			
17		182						340	965	321	* 399	4,800			
18		179		171	403	290		340	720	299	* 581	2,440	936		
19		178		362	174	344	305	341	636	459	* 466	1,400	953		
20		175		317	174	330	299	341	516	* 353	* 339	985	953		
21		165						342	477	* 304	* 304	985		1,010	
22		160						342	459	272	* 299	833	971		
23		158						336	600	352	* 293	982	953		
24		164						324	756	537	* 296	2,050	971		
25		194						312	477	1,430	* 292	5,260	904		
26		176		218	135	224	214	322		406	1,130	* 294	4,030	1,040	
27		173		219	147	211	222	311		406	1,190	* 296	6,070	1,120	
28		163	*	194	155	201	256	309		311	388	872	* 558	1,060	
29		154			150	173	253	296		319	371	1,040	* 487	4,840	
30	*	148			139	* 160	252	270		329	353	833	* 371	5,300	
31										341		* 328	5,230	1,040	
Sum								11,915		14,799		58,953			
									20,094		* 12,736				

Month	Agua Verde Station			Current Year 1947			Period		
	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High			Normal	Maximum	Minimum
Apr.	1.80	1.08	1	667	327	301	397	23,600	
May	5.25	4.27	10	2,510	9	273	648	39,900	
June	4.30	.98	25	1,950	11	267	493	29,400	
July	3.05	.98	3	1,120	25	* 272	* 411	* 25,300	
Aug.	9.38	.89	25	8,120	12	241	1,900	117,000	
Yearly									

* Estimated * Partly estimated + And other days

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 Acufia, 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 upon 29 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: May 1900 to October 1914; December 1919 to March 1920; and January 1924 to December 1947.

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

EXTREME FLOWS: The highest recorded gage height was about 3:00 P. M. June 17, 1922, when the extreme gage height was 56.9 feet; the estimated discharge for this stage from extension of the rating curve was 204,000 second-feet. The lowest flow ever recorded was in May 1904, with an extreme of 270 second-feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,280	1,730	1,250	739	410	434	957	421	* 7,140	1,600	1,270	1,330
2	1,210	1,480	1,260	683	399	428	737	538	* 7,020	1,620	1,100	1,290
3	1,140	1,470	1,110	646	383	423	821	923	8,130	1,410	902	1,310
4	1,100	1,430	1,020	610	375	443	1,070	554	* 6,530	1,260	820	1,360
5	1,090	1,240	1,070	576	365	414	829	463	* 4,720	1,300	767	1,380
6	1,170	1,190	1,050	556	357	402	647	434	* 4,050	1,390	760	1,470
7	1,160	1,290	998	530	342	392	558	417	* 3,390	1,280	860	1,430
8	1,290	1,580	1,050	519	339	386	486	406	* 2,920	1,080	883	1,500
9	1,250	1,440	1,060	502	340	382	444	411	* 2,800	992	867	1,380
10	1,330	1,340	1,020	477	1,150	365	415	400	* 2,780	910	989	1,170
11	1,590	1,430	962	460	8,200	360	405	383	8,590	* 828	1,010	1,200
12	1,510	1,390	988	446	1,440	371	401	367	12,800	■ 813	979	1,240
13	1,350	1,410	948	433	1,330	456	375	357	* 5,100	■ 789	1,050	1,210
14	1,450	1,520	908	432	2,240	610	445	362	* 4,900	■ 766	1,110	1,240
15	1,470	1,630	927	428	1,940	518	414	710	* 4,800	■ 789	1,150	1,120
16	1,350	1,610	952	444	1,630	420	418	1,040	* 5,000	1,180	1,170	1,070
17	1,600	1,510	904	443	1,260	440	499	4,640	* 4,500	■ 812	1,190	1,100
18	1,650	1,520	1,760	451	985	416	441	3,900	* 4,230	1,350	1,210	1,080
19	1,540	1,510	924	432	864	437	478	1,950	4,130	* 1,080	1,150	1,050
20	1,450	1,600	983	432	783	683	507	1,370	3,950	* 908	1,180	1,050
21	1,470	1,490	968	432	684	454	399	1,180	3,740	* 796	1,250	1,100
22	1,380	1,590	1,110	432	636	418	372	1,150	3,500	* 780	1,260	1,090
23	1,600	1,450	1,180	426	616	392	357	1,100	3,280	773	1,240	1,050
24	1,550	1,240	1,180	420	824	466	355	1,530	2,960	758	1,260	1,060
25	1,580	1,190	1,130	409	876	1,170	362	4,960	* 2,680	732	1,270	1,040
26	1,520	1,130	1,020	398	562	1,180	360	4,580	* 2,530	698	* 1,400	1,030
27	1,420	1,120	927	398	500	1,350	380	5,880	* 2,350	680	1,470	1,130
28	1,500	1,140	* 848	393	494	1,170	404	6,320	2,180	766	1,490	1,200
29	1,560	■ 805	399	469	944	638	* 5,370	* 1,940	733	1,480	1,130	1,220
30	1,620	■ 780	415	456	1,100	548	* 5,500	* 1,830	2,220	1,350	1,220	1,090
31	1,650	■ 764	439			462	* 5,070			1,860		
Sum			39,670	14,351	31,688	17,424		*62,686		*32,953		37,120
43,830			31,856						15,982	*134,450		33,867

Current Year 1947

Period 1924-1947

Acre-Feet

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1947
	High	Low	Day	Day			Normal	Maximum	Minimum	
Jan.	1.76	1.16	31	1,690	5	1,080	1,410	86,900	97,199	* 245,000
Feb.	1.84	1.18	1	1,780	27	1,000	1,420	78,700	82,236	* 117,000
Mar.	3.59	■ 74	18	4,310	31	747	1,050	63,200	78,292	118,000
Apr.	.73	.25	1	739	28	393	478	28,500	63,483	105,000
May	12.40	.19	11	22,500	8	339	1,020	62,900	103,020	271,000
June	1.86	.21	25	1,840	12	355	581	34,600	102,874	299,000
July	1.27	.23	4	1,200	23	352	516	31,700	162,018	719,000
Aug.	5.39	.16	28	7,940	13	352	* 2,020	* 124,000	208,138	33,800
Sept.	9.44	1.74	12	15,900	30	1,690	* 4,480	* 267,000	390,420	1,410,000
Oct.	3.63	.71	30	4,350	27	671	* 1,060	* 65,400	267,768	1,063,000
Nov.	1.66	.77	28	1,520	7	724	1,130	67,200	105,199	* 211,000
Dec.	1.89	1.14	3	1,790	26	1,010	1,200	73,600	92,906	135,000
Yearly	12.40	.16		22,300		339	*1,360	*983,700	1,753,561	3,851,500
									879,000	1,874,320

* 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 upon 21 meter measurements during the year. Water-stage recorder installed May 11, 1942. Computations by shifting channel methods. 1947 records good. Records available: March 17, 1898 to December 3, 1898, and May 1900 to December 1947.

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. An extreme gage height of 35.75 feet was reported on April 6, 1900; discharge based upon 1935 rating curve was 107,000 second-feet. The lowest flow ever recorded was on August 31, 1930, when the extreme gage height was -0.15 foot and the extreme flow was 97 second-feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	270	249	229	221	205	290	264	170	219	188	185	210
2	268	248	225	220	200	287	246	174	214	186	185	209
3	263	248	219	215	198	278	237	179	210	186	182	211
4	260	245	224	214	197	275	227	208	204	186	182	219
5	261	244	223	200	195	264	218	198	202	186	180	221
6	262	241	217	195	191	260	214	188	197	186	180	240
7	266	243	219	196	189	252	211	185	190	186	175	246
8	270	237	223	197	184	247	207	179	186	188	176	235
9	284	236	228	201	181	242	203	176	184	208	176	229
10	288	238	226	196	198	235	199	172	184	194	180	227
11	285	235	230	189	2,650	236	195	169	193	188	181	228
12	278	237	235	188	1,510	291	194	166	933	186	181	228
13	271	239	236	180	860	980	193	165	978	186	184	232
14	271	236	240	181	501	362	188	164	324	188	191	233
15	271	258	239	182	786	279	190	164	280	186	194	236
16	270	234	240	186	405	264	191	163	271	188	197	234
17	343	234	241	187	370	252	193	160	268	186	209	234
18	* 314	236	259	188	359	242	186	157	260	186	213	232
19	** 304	229	276	192	1,220	237	191	155	292	186	212	231
20	** 302	226	269	193	765	272	182	154	245	183	214	229
21	* 299	228	254	194	482	309	178	160	237	180	218	228
22	289	231	246	195	395	271	173	176	227	176	217	226
23	284	233	245	196	361	254	167	180	219	176	220	228
24	281	229	237	197	346	244	165	195	216	178	216	226
25	278	226	233	195	358	1,640	166	182	211	181	215	228
26	267	228	232	193	351	838	168	182	207	184	214	226
27	267	230	228	197	322	484	166	285	206	187	210	224
28	263	230	226	201	312	367	167	264	201	187	209	222
29	263	219	203	299	328	166	325	197	192	208	208	222
30	256	227	207	296	291	168	260	195	198	207	207	222
31	252	225	203	293	168	233	168	233	193	195	221	
Sum	6,608	5,899	11,071	6,346	5,789	7,037						
	8,600	7,270	15,179	5,981	8,110	5,911						

Month	Current Year 1947			Period 1924-1947			Acre-Feet					
	Extreme Gage Feet		High Day	Extreme Second-Feet		Total Acre-Feet						
	High	Low		High	Low							
Jan.	1.21	.88	17	370	31	249	277	17,100	25,356	78,200	12,900	28,170
Feb.	.90	.84	1	255	20	226	256	13,200	20,017	62,500	10,900	22,420
Mar.	1.00	.83	19	283	29	216	235	14,400	19,025	40,700	11,100	19,980
Apr.	.89	.69	2	229	13	177	197	11,700	17,396	42,400	9,520	18,670
May	6.64	.60	11	6,100	9	179	490	30,100	35,903	156,000	10,800	26,570
June	6.61	.79	13	6,040	11	230	369	22,000	36,395	197,000	9,340	38,014
July	1.00	.64	1	277	29	164	193	11,900	24,326	84,200	7,620	31,330
Aug.	3.76	.58	26	2,090	20	151	205	12,600	20,160	50,400	7,620	22,490
Sept.	4.46	.63	12	2,870	10	181	270	16,100	44,476	324,420	6,190	27,510
Oct.	.79	.64	9	217	422	176	187	11,500	55,865	186,000	9,520	78,200
Nov.	.79	.62	23	223	8	173	197	11,700	30,095	209,000	10,300	39,860
Dec.	.93	.76	7	256	2	206	227	14,000	24,864	91,800	12,200	27,730
Yearly	6.64	.58		6,100	151	257	186,200	353,878	1,330,900	176,780	380,944	

* 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. Prior to June 23, 1946 the elevation of the zero of the gage was 971.9 feet, both elevations above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based on 19 meter measurements made by wading, with the discharge estimated between measurements. Records available: February 23, 1929, to December 1947. Annual discharges for the years 1924 to 1928, inclusive, as well as monthly discharges for January and February, 1929, were estimated. 1947 records fair.

REMARKS: The flow of this spring is very uniform and not modified by diversions or storage. When the Rio Grande reaches a discharge of about 35,000 second-feet near this spring backwater reaches this gaging station. 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 .43 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 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	# 205	# 203	# 195	# 189	# 188	# 178	# 178	# 168	# 170	# 163	# 159	# 148
2	# 205	# 203	# 195	# 189	# 188	# 178	# 178	# 168	# 170	# 163	# 159	# 148
3	# 205	# 202	# 194	# 189	# 188	# 178	# 178	# 168	# 170	# 163	# 159	# 147
4	# 205	# 202	# 194	# 188	# 188	# 178	# 177	# 168	# 170	# 163	# 158	# 147
5	# 205	# 202	# 194	# 188	# 188	# 178	# 177	# 168	# 170	# 164	# 158	# 146
6	# 205	# 202	# 193	# 187	# 187	# 178	# 177	# 168	# 170	# 164	# 158	# 146
7	# 205	# 202	# 193	# 187	# 187	# 178	# 177	# 168	# 170	# 164	# 157	# 146
8	# 220	# 201	# 193	# 186	# 187	# 178	# 177	# 168	# 170	# 164	# 157	# 145
9	# 210	# 201	# 192	# 186	# 187	# 178	# 176	# 168	# 170	# 164	# 156	# 145
10	# 208	# 201	# 192	# 186	# 195	# 178	# 175	# 168	# 170	# 164	# 156	# 145
11	# 207	# 201	# 192	# 185	# 190	# 190	# 175	# 168	# 170	# 164	# 156	# 144
12	# 206	# 200	# 191	# 185	# 185	# 185	# 174	# 168	# 168	# 164	# 155	# 144
13	# 206	# 200	# 191	# 184	# 184	# 180	# 173	# 168	# 180	# 164	# 155	# 143
14	# 206	# 200	# 191	# 184	# 184	# 180	# 172	# 168	# 175	# 164	# 156	# 143
15	# 206	# 200	# 190	# 185	# 183	# 180	# 172	# 168	# 172	# 164	# 165	# 143
16	# 206	# 199	# 190	# 185	# 182	# 180	# 171	# 168	# 170	# 164	# 155	# 142
17	# 206	# 199	# 215	# 186	# 182	# 180	# 170	# 168	# 169	# 164	# 154	# 142
18	# 206	# 199	# 200	# 186	# 181	# 179	# 195	# 168	# 168	# 163	# 153	# 142
19	# 206	# 198	# 198	# 187	# 181	# 179	# 180	# 168	# 167	# 163	# 153	# 141
20	# 206	# 198	# 196	# 187	# 180	# 179	# 175	# 168	# 166	# 163	# 152	# 141
21	# 206	# 198	# 195	# 188	# 179	# 179	# 172	# 168	# 165	# 163	# 152	# 140
22	# 206	# 197	# 195	# 188	# 179	# 179	# 168	# 168	# 164	# 162	# 151	# 140
23	# 206	# 197	# 194	# 189	# 178	# 179	# 168	# 168	# 163	# 162	# 151	# 140
24	# 206	# 197	# 194	# 189	# 178	# 179	# 168	# 168	# 163	# 162	# 151	# 140
25	# 206	# 196	# 193	# 189	# 178	# 179	# 168	# 168	# 163	# 162	# 150	# 139
26	# 205	# 196	# 192	# 189	# 178	# 178	# 168	# 168	# 190	# 163	# 150	# 139
27	# 205	# 196	# 192	# 188	# 178	# 178	# 168	# 175	# 163	# 161	# 150	# 139
28	# 204	# 195	# 191	# 188	# 178	# 178	# 168	# 170	# 163	# 161	# 149	# 139
29	# 204	# 191	# 188	# 178	# 178	# 178	# 168	# 170	# 163	# 161	# 149	# 139
30	# 203	# 190	# 188	# 178	# 178	# 178	# 168	# 170	# 163	# 160	# 148	# 138
31	# 203	# 190	# 189	# 178	# 178	# 178	# 168	# 170	# 163	# 160	# 148	# 138
Sum	*5,585		*5,613		*5,377		*5,245		*5,048		*4,419	
	*6,388		*6,006		*5,675		*5,379		*5,060		*4,632	

Month	Extreme Gage Feet			Extreme Second-Feet			Average Second-Feet	Total	Period 1924-1947			Acre-Feet Normal 1938-1947	
	Extreme Gage Feet		Day	Extreme Second-Feet		Day	Low		Acre-Feet	Acre-Feet			
	High	Low		High	Low		Day	Normal		# Maximum	# Minimum		
Jan.			8	# 220	430	# 203	*	206	* 12,700	8,675	19,620	6,130	
Feb.	# 1		203	28	# 195	*	194	* 11,100	7,705	17,030	5,350	6,589	
Mar.	17		215	# 15	# 190	*	194	* 11,900	8,190	17,770	5,900	7,183	
Apr.	# 1		189	113	# 184	*	187	* 11,100	7,762	16,580	5,560	7,106	
May	10		195	# 243	# 178	*	183	* 11,300	8,470	16,840	5,850	7,956	
June	11		190	# 1	# 178	*	179	* 10,700	8,589	16,040	5,330	7,799	
July	18		195	# 322	# 168	*	174	* 10,700	9,127	16,460	5,930	8,854	
Aug.	26		190	# 1	# 168	*	169	* 10,400	8,752	15,840	5,450	8,339	
Sept.	12		190	# 323	# 163	*	159	* 10,000	10,182	25,000	6,550	8,573	
Oct.	# 5		164	# 30	# 160	*	163	* 10,000	10,051	25,870	6,840	8,933	
Nov.	15		165	50	# 148	*	154	* 9,190	9,229	21,850	6,540	8,203	
Deo.	# 1		148	# 430	# 138	*	143	* 8,770	9,065	20,470	6,380	8,101	
Yearly			# 220		# 138	*	177	* 127,860	105,797	192,840	78,490	95,146	

* Estimated * Partly estimated \$ Mean daily # And other days @ Period 1929-1947

GOODENOUGH SPRING NEAR COMSTOCK, TEXAS

REVISION OF 1946 DISCHARGE

DESCRIPTION: Water-stage recorder and light cable (winch operated, for carrying current meter and light weights only), 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. Prior to June 23, 1946 the elevation of the gage was 971.9 feet, both elevations above mean sea level, U.S.C. & G.S. datum.

REMARKS: At this station the channel is in solid rock, with one bank overhanging several feet. On June 23, 1946 an old dam, about 3,000 feet below the water-stage recorder, washed out, causing the entire channel to subsequently degrade about 2 feet, and rendering the recorder ineffective. A staff gage has been used at this point since that date. The badly eroded channel, which cut under the overhanging bank, was not discovered until later. The corrected discharges below include the portion of the stream flow which passed the measuring section under the overhanging bank.

Mean Daily Discharge in Second-Feet 1946 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						145	292	231	201	216	219	203
2						143	290	229	201	214	218	203
3						141	288	228	201	212	218	202
4						140	285	226	201	210	217	202
5						140	283	224	200	220	216	202
6						140	281	223	200	240	216	201
7						140	279	221	200	250	215	201
8						139	276	220	200	268	215	200
9						137	274	219	200	266	214	200
10						137	272	217	199	264	213	205
11						135	270	216	199	262	213	215
12						135	268	215	199	260	212	205
13						134	265	214	199	258	211	205
14						134	263	213	199	256	211	205
15						133	261	211	198	254	210	205
16						133	259	210	198	251	209	205
17						133	256	209	198	248	209	205
18						133	254	208	198	246	208	205
19						132	252	207	198	243	208	205
20						135	250	205	198	240	207	205
21						135	249	204	197	237	207	205
22						135	247	203	197	234	206	205
23						* 300	245	203	197	231	206	205
24						* 310	244	203	197	229	206	205
25						* 309	242	202	197	226	205	205
26						308	241	202	196	223	205	205
27						307	239	202	196	222	205	205
28						305	237	202	196	222	204	205
29						304	236	202	220	221	204	205
30						303	234	201	218	220	203	205
31						303	232	201	220	220	203	205
Sum						*5,455		*6,571		*7,363		*6,354
							*8,064		*5,998		*6,310	

Current Year 1946

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet				
	Extreme Gage Feet		Day	Extreme Second-Feet				Normal	@ Maximum	@ Minimum		
	High	Low		High	Low							
Jan.	.98	.72	4	124	27	100	110	6,780	8,500	19,620	6,130	
Feb.	.77	.68	25	106	14	96.9	100	5,570	7,557	17,030	5,350	
Mar.	.74	.58	15	112	\$31	102	106	6,520	8,028	17,770	5,900	
Apr.	1.95	.51	20	168	18	95.6	103	6,120	7,617	16,580	5,560	
May	2.71	.76	5	209	4	107	138	8,500	8,347	16,840	5,850	
June	* 3.77	1.20	23	* 574	19	131	* 182	* 10,800	8,497	16,040	5,330	
July			1	292	31	32	* 260	* 16,000	9,058	16,460	5,930	
Aug.			1	231	31	201	* 212	* 13,000	8,680	15,840	5,450	
Sept.			29	220	28	196	* 200	* 11,900	10,190	25,000	6,550	
Oct.			8	268	4	210	* 238	* 14,600	10,053	* 25,870	6,840	
Nov.			1	219	30	203	* 210	* 12,500	9,231	21,850	6,540	
Dec.			10	225	8	200	* 205	* 12,600	9,077	20,470	6,380	
Yearly				574		95.6	173	*124,890	104,835	192,840	78,490	

* Estimated * Partly estimated ♦ Mean daily ♦ Period 1929-1946 ♦ 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. High-stage measurements from highway bridge, low-stage measurements by wading. Zero of gage is 951.80 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 12 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: May 1900 to March 1914 at a point .8 mile below Southern Pacific railroad bridge; December 1923 to September 1, 1932, at a point .2 mile above Southern Pacific railroad bridge; September 2, 1932 to December 31, 1947 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. This corresponds to a flow of 143 second-feet per square mile of watershed. Zero flow sometimes occurs for a few hours at this station. When this happens, the gage height falls to .84 foot or below.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1	314	292	246	238	198	216	232	212	211	219	201	237	
2	288	264	241	226	187	174	239	247	259	230	192	237	
3	302	277	247	231	187	176	225	287	245	215	215	239	
4	250	249	253	240	174	185	238	250	237	212	211	256	
5	262	269	249	213	166	183	185	246	254	216	210	239	
6	274	286	297	225	193	180	227	215	241	229	253	240	
7	278	265	268	219	168	203	200	227	225	249	210	237	
8	278	258	237	223	159	232	207	226	268	223	212	224	
9	286	269	252	222	177	166	206	211	265	211	223	203	
10	283	265	245	225	255	184	213	212	238	204	237	211	
11	317	272	259	202	271	169	221	225	248	234	211	207	
12	266	273	284	193	219	183	257	217	2,290	192	236	197	
13	277	269	226	220	177	199	227	217	764	205	228	196	
14	276	258	237	174	176	196	229	215	558	213	261	212	
15	259	291	249	193	179	241	227	214	345	208	229	226	
16	286	264	232	215	654	249	217	215	347	212	219	212	
17	426	251	254	195	522	237	209	218	266	227	334	228	
18	490	260	345	186	236	213	211	208	264	204	255	208	
19	452	249	255	203	252	247	627	205	263	217	222	203	
20	426	226	270	181	232	235	363	207	225	170	238	188	
21	371	270	266	212	193	215	231	218	275	247	249	219	
22	333	259	248	189	179	190	231	583	220	190	292	* 215	
23	400	251	250	185	249	253	241	439	236	203	247	* 212	
24	314	234	229	192	171	215	207	353	207	197	250	208	
25	318	252	227	288	169	249	207	269	223	202	245	206	
26	324	238	235	211	201	223	222	482	215	212	219	201	
27	315	253	237	203	179	232	245	321	215	224	231	188	
28	294	271	224	201	192	221	240	246	229	220	215	198	
29	327	225	180	216	235	213	253	215	233	218	207		
30	268	233	236	173	212	252	247	238	219	242	228		
31	268	234		183		205	254		207		304		
Sum		7,335		6,321		6,313		8,139		10,286		6,644	
		7,751		6,997		7,151						6,985	

* Partly estimated

ARROYO LAS VACAS NEAR VILLA ACUÑA, 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. Prior to September 7, 1939 a staff gage at the same location and on the same datum was used.

RECORDS: Based upon 90 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: occasional estimates from June 1935 to March 20, 1938, after which the present record extends to December 31, 1947.

REMARKS: The low flow of this stream is from springs. Backwater from the Rio Grande reaches this station whenever the stage at Del Rio Station reaches about 21.0 feet on the present gage, 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. 0.7 second-feet on various days in November 1938 and on March 16, 1940 with a gage height of 0.98 foot.

Average Flow in Second-Feet

Daily:	Mar.	3,530	Oct. 3, 1944.	Min. 0.7	Nov. 1938 & Mar. 1940.
Monthly:	Mar.	153	Oct. 1944.	Min. 1.1	Jan. 1938.
Yearly:	Max.	25.8	1944.	Min. 7.4	1939.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.9	10.2	5.3	5.3	4.6	4.2	4.9	7.1	4.6	3.9	5.3	8.8
2	4.9	10.2	6.4	5.3	4.6	4.2	4.9	7.1	4.6	3.9	5.3	6.7
3	4.9	10.2	6.4	5.3	4.6	4.2	4.2	9.5	4.6	3.9	4.9	4.6
4	4.9	10.6	6.4	5.3	4.6	4.2	4.2	9.5	4.6	3.9	4.9	5.3
5	6.0	10.6	6.4	4.6	5.3	4.2	3.9	8.1	3.9	3.2	4.6	4.6
6	6.0	16.6	6.4	5.3	5.3	4.2	3.9	7.8	3.9	3.9	3.9	4.9
7	5.6	10.2	5.3	5.3	5.3	4.6	3.9	6.4	3.9	4.2	3.9	5.6
8	5.3	10.2	6.4	5.3	5.3	4.6	3.9	6.4	3.9	3.9	4.6	4.9
9	6.7	6.4	6.4	5.3	5.3	3.9	3.5	6.4	5.3	3.9	4.9	4.9
10	7.1	6.4	6.4	4.6	4.73	3.9	3.5	6.0	5.3	3.9	4.2	5.7
11	7.1	6.7	5.3	4.5	139	4.6	3.5	* 64.6	5.3	3.9	3.9	5.6
12	6.7	6.7	5.3	4.6	57.6	4.6	4.6	* 1,056	3.6	3.9	5.7	5.7
13	6.7	6.4	4.6	4.6	25.8	3.9	4.6	6.0	58.6	3.6	3.9	4.6
14	6.7	6.4	4.6	5.3	16.2	3.9	5.7	5.7	16.6	3.6	2.8	6.0
15	6.7	6.0	4.6	5.3	9.5	3.2	6.4	5.7	10.6	3.5	3.9	5.3
16	6.0	4.9	4.9	5.3	14.5	3.2	6.4	5.7	10.9	3.5	4.2	5.3
17	14.1	4.6	4.6	5.3	15.4	3.5	6.4	5.7	10.9	3.2	12.0	4.9
18	23.0	4.9	113	5.3	7.8	3.5	6.4	5.7	9.5	3.2	10.2	5.3
19	15.2	4.9	8.1	5.3	75.6	137	31.4	5.3	9.5	3.2	6.4	5.7
20	15.9	4.6	6.0	5.3	17.0	6.7	10.6	5.3	7.8	3.2	6.7	5.3
21	16.2	5.3	5.7	5.3	6.7	4.2	9.2	5.3	7.1	3.2	6.7	6.4
22	16.2	6.0	6.0	5.3	6.7	3.5	8.1	424	5.7	3.2	6.7	7.1
23	16.6	5.6	4.9	5.3	189	3.5	8.1	60.0	6.0	3.2	7.1	7.1
24	17.0	6.4	4.6	5.3	44.1	3.5	6.7	222	5.3	3.2	7.1	6.0
25	10.6	5.6	5.7	11.3	5.7	802	6.7	37.8	5.3	3.2	5.3	5.7
26	6.7	5.3	5.3	6.0	4.9	37.8	6.7	15.2	5.3	3.2	4.6	5.3
27	10.6	5.3	5.3	6.0	4.9	10.6	6.7	9.5	4.9	3.2	4.9	4.9
28	10.6	5.3	4.9	6.0	4.9	10.6	7.1	6.0	4.9	79.1	4.9	5.3
29	10.9	5.3	5.3	4.9	6.7	7.1	4.9	3.9	103	5.3	4.9	4.9
30	10.9	5.3	5.3	4.9	5.7	7.1	4.9	3.5	2.8	8.1	5.7	3.9
31	17.0	5.3	5.3	4.9	5.7	7.1	4.6	5.3				
Sum		202.5	163.5		1,104.4			987.7		285.7		172.0
		307.7	281.1	1,175.9		207.4			* 1,292.2		163.7	

Current Year 1947

Period 1938-1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	Day	Low			Normal	Maximum	Minimum
Jan.	1.74	1.48	17	34.3	#	4.2	610	425	910	79.4
Feb.	1.64	1.54	5	17.0	#	4.6	402	440	1,380	113
Mar.	3.61	1.44	18	713	23	4.2	558	921	2,600	161
Apr.	1.97	1.48	25	68.9	#	4.6	544	1,157	4,580	168
May	6.36	1.48	10	3,010	29	4.2	2,330	1,419	4,310	156
June	10.93	1.44	25	9,500	#	3.2	36.8	990	3,900	118
July	2.07	1.44	19	149	#	3.5	6.7	411	1,392	7,040
Aug.	5.15	1.44	22	2,780	31	4.6	31.9	863	1,960	129
Sept.	* 7.94	1.41	12	* 7,380	#	2.8	* 43.1	* 2,560	1,351	6,850
Oct.	4.36	1.31	29	1,270	#	3.2	9.2	567	1,330	9,390
Nov.	2.17	1.28	17	109	6	2.5	5.5	325	145	1,670
Dec.	1.57	1.38	#	7.1	5	3.9	5.5	341	372	704
Yearly	10.93	1.28		9,500		2.5	17.4	12,578	11,105	18,808
										5,130

* Estimated * Partly estimated # Various days of the month

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 695.6 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. All previously published elevations are 0.50 feet too low. Prior to February 20, 1942 the zero of the gage was 865.30 feet.

RECORDS: Based upon 18 meter measurements during the year, 11 by the United States and 7 made jointly by the United States and Mexican Sections of this Commission. Computations by shifting channel methods. 1947 records poor. Records available: July 2, 1941 to December 1947. 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. Several small springs as well as Ciénegas Creek and Las Vacas Arroyo enter the river between the upper and lower station sites.

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 extreme gage height was 34.5 feet with a discharge of 605,000 second-feet. This is the greatest rate of discharge ever recorded at any point on the Rio Grande. The lowest flow ever recorded was on June 15, 1945, when the extreme gage height was 0.19 feet and the extreme flow was 863 second-feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan. *	Feb. *	March *	April *	May	June	July	Aug.	Sept.	Oct. *	Nov. *	Dec. *
1	2,280	2,620	2,040	1,620	* 1,200	1,300	2,090	* 1,200	6,160	2,570	2,400	2,200
2	2,210	2,640	2,120	1,590	* 1,190	1,270	1,910	* 1,200	7,430	2,400	1,980	2,180
3	2,170	2,480	2,140	1,530	* 1,150	1,220	1,710	* 1,400	7,920	2,410	1,840	2,140
4	2,050	2,440	2,010	1,530	* 1,140	1,190	1,630	* 2,000	8,130	2,200	1,630	2,160
5	1,990	2,410	1,950	1,480	* 1,120	1,190	1,920	* 1,500	6,750	2,050	1,550	2,200
6	2,040	2,250	2,020	1,420	* 1,050	* 1,170	1,670	* 1,290	* 5,460	2,100	1,500	2,230
7	2,100	2,150	1,950	1,380	* 1,070	* 1,170	1,460	* 1,210	* 4,850	2,180	1,480	2,300
8	2,130	2,230	1,860	1,370	* 1,050	* 1,150	1,340	* 1,180	* 4,340	2,140	1,540	2,240
9	2,290	2,480	1,940	1,340	* 1,050	* 1,140	1,250	* 1,160	* 3,900	1,830	1,590	2,270
10	2,290	2,350	1,960	1,540	1,650	* 1,100	* 1,190	* 1,160	* 3,470	1,760	1,580	2,160
11	2,360	2,240	1,910	1,300	8,330	1,080	* 1,170	* 1,400	4,350	1,680	1,670	1,960
12	2,560	2,330	1,860	1,260	5,920	1,070	* 1,160	* 1,130	19,300	1,600	1,670	1,960
13	2,480	2,250	1,840	1,250	3,830	1,230	* 1,130	* 1,090	11,900	1,560	1,700	2,000
14	2,320	2,270	1,800	1,210	2,860	3,020	* 1,140	1,060	* 6,600	1,540	1,770	1,990
15	2,400	2,430	1,800	1,180	3,490	1,600	* 1,150	1,050	* 6,000	1,500	1,830	2,030
16	2,480	2,500	1,790	1,200	3,490	1,440	* 1,140	* 1,300	* 5,800	1,500	1,920	1,920
17	2,700	2,480	1,870	1,200	3,020	1,300	* 1,140	* 1,700	* 5,940	1,860	2,100	1,860
18	3,200	2,390	2,300	1,150	2,470	1,220	* 1,280	* 5,400	* 5,300	1,590	2,050	1,900
19	2,900	2,380	2,690	1,160	2,320	1,450	* 1,800	* 3,750	* 5,000	1,950	2,000	1,890
20	2,700	2,340	1,920	1,160	2,900	1,270	* 1,550	2,710	* 4,900	1,800	1,950	1,840
21	2,550	2,460	1,890	1,160	2,210	1,510	* 1,350	2,270	* 4,730	1,690	2,010	1,830
22	2,520	2,380	1,860	1,180	1,840	1,360	* 1,230	2,730	* 4,470	1,560	2,070	1,860
23	2,480	2,460	2,020	1,160	1,880	1,260	* 1,200	2,370	* 4,270	1,510	2,080	1,850
24	2,600	2,320	2,040	1,190	1,700	1,220	* 1,090	2,310	* 4,030	1,470	2,030	1,820
25	2,580	2,140	2,030	1,290	1,690	2,100	* 1,060	2,720	* 3,690	1,460	2,050	1,820
26	2,630	2,080	2,000	1,250	1,900	3,380	* 1,060	6,060	* 3,460	1,420	2,060	1,800
27	2,560	2,060	1,900	1,220	1,550	2,700	* 1,070	6,080	* 3,300	1,400	2,180	1,770
28	2,440	2,050	1,780	1,210	1,410	2,510	* 1,070	6,740	* 3,140	1,450	2,270	1,860
29	2,510	1,700	1,210	1,380	2,300	* 1,080	6,900	* 2,930	1,600	2,300	1,940	1,940
30	2,560	1,650	1,210	1,330	2,000	* 1,200	* 6,000	* 2,740	1,450	2,300	1,890	1,890
31	2,550	1,620		1,290			* 1,280	* 6,300		2,800		2,040
Sum	*65,590			*38,750			47,820	*84,370			*56,030	*61,910
	*75,630			*60,260			68,480	*41,520			*170,260	*57,100

Month	Extreme Gage Feet			Extreme Second-Feet			Average Second-Feet	Total Acre-Feet	Period 1929-1947			Acre-Feet Normal 1938-1947		
	High		Day	High		Low			Normal	Maximum	Minimum			
	High	Low	Day	High	Low	Day			Normal	Maximum	Minimum			
Jan.	2.18	1.31	18	*	3,360	5	* 1,920	* 2,440	* 150,000	167,490	344,000	103,000		
Feb.	1.86	1.32	2	*	2,760	28	* 1,950	* 2,340	* 130,000	142,228	229,970	96,200		
Mar.	2.23	1.03	19	*	5,480	31	* 1,570	* 1,940	* 120,000	140,311	224,670	94,700		
Apr.	1.15	.68	1	*	1,710	27	* 1,150	* 1,290	* 76,900	127,535	200,000	* 76,900		
May	7.65	.61	11	20,300	7	982	2,210	136,000	206,177	* 742,000	68,200	179,820	114,320	
June	4.99	.61	25	10,300	11	1,040	1,590	94,900	210,318	704,000	61,700	191,760		
July	1.52	.55	19	*	2,490	29	* 1,020	* 1,340	* 82,400	247,692	* 1,228,000	* 82,400	* 333,420	
Aug.	4.33	.56	27	8,490	14	1,030	* 2,720	* 167,000	272,253	865,000	* 74,700	271,370		
Sept.	11.77	1.64	12	41,700	30	* 2,660	* 5,680	* 338,000	560,115	2,754,590	72,600	499,970		
Oct.	2.33	.85	31	*	3,750	27	* 1,340	* 1,810	* 111,000	410,873	1,654,000	110,000	450,700	
Nov.	1.92	.86	1	*	2,890	7	* 1,420	* 1,900	* 113,000	184,988	467,000	108,000	188,600	
Dec.	1.58	1.14	8	*	2,380	27	* 1,740	* 2,000	* 123,000	165,881	295,180	102,000	155,300	
Yearly	11.77	.55		41,700		*	982	* 2,270	* 1,642,200	2,835,861	6,041,720	1,639,000	2,799,450	

* And other days * Partly 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 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 upon 12 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: September 1, 1931 to December 31, 1947.

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 whenever 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.	2.5		Nov. 30, 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 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	# 28.0	58.7	25.7	26.8	24.0	19.4	33.0	41.2	33.9	28.8	31.7	25.9
2	26.7	57.8	24.4	27.4	22.6	16.5	34.5	47.0	33.2	28.8	32.3	24.5
3	26.1	57.8	22.4	28.1	21.4	20.1	35.9	65.8	33.2	28.2	32.3	27.1
4	27.5	57.8	21.1	28.1	22.6	18.9	37.5	46.1	35.2	29.0	31.0	31.5
5	27.6	57.9	21.1	26.8	20.8	19.6	30.9	41.4	33.2	28.3	31.8	27.8
6	27.0	57.9	22.2	27.3	20.8	20.2	28.2	42.3	33.3	28.4	31.1	27.0
7	28.3	57.0	22.1	24.7	20.8	19.0	29.0	41.5	33.3	29.1	30.4	26.4
8	27.8	57.9	22.7	26.0	19.6	15.1	31.8	36.9	32.6	28.5	31.8	29.2
9	29.1	57.9	23.2	27.3	20.2	15.1	31.8	35.4	33.3	27.3	31.8	29.2
10	28.5	58.8	22.5	27.3	150	15.6	34.0	36.3	34.2	27.3	31.8	26.9
11	35.3	57.9	23.1	26.7	72.9	20.6	39.3	* 166	34.2	28.1	29.1	26.2
12	48.4	57.9	24.3	27.3	45.2	16.3	39.4	* 58.1	34.4	28.8	28.5	25.6
13	47.5	57.8	24.2	28.0	44.4	18.0	40.2	48.8	41.6	27.5	29.1	26.8
14	47.6	57.8	24.9	27.3	40.3	25.6	39.5	47.2	42.5	28.3	28.5	28.2
15	48.5	58.6	24.1	26.0	37.2	24.9	37.2	39.3	36.6	28.3	28.5	28.2
16	49.4	57.6	24.1	26.7	41.1	21.1	37.3	37.8	35.0	28.3	29.1	26.0
17	61.8	46.4	24.8	27.3	41.9	20.0	32.2	36.4	32.8	27.0	115	25.4
18	62.2	28.9	35.6	31.5	41.9	17.2	34.4	35.0	31.6	27.0	53.4	29.6
19	53.0	25.7	26.8	31.5	68.6	1,990	43.6	37.9	30.9	27.0	36.0	28.8
20	52.2	25.7	26.1	32.9	42.7	32.3	45.3	37.9	* 29.6	26.4	33.2	27.3
21	53.1	25.6	26.1	30.8	42.7	22.5	39.8	37.9	31.6	25.8	33.2	28.8
22	* 53.1	24.9	27.4	28.0	42.7	24.4	38.3	141	31.0	25.9	35.2	28.7
23	* 53.2	* 25.5	26.8	26.7	66.2	24.5	38.4	42.7	31.0	26.5	38.1	27.9
24	* 54.0	26.1	24.1	26.0	37.2	23.9	38.4	38.0	30.4	26.5	35.2	27.2
25	* 55.0	26.6	27.4	36.6	36.4	46.8	40.1	38.0	29.7	27.7	32.5	27.2
26	56.8	27.3	30.9	* 35.1	34.1	32.8	40.1	63.9	29.1	28.4	35.5	27.2
27	* 57.8	27.9	27.4	35.1	30.5	29.2	40.2	45.1	30.5	28.4	34.7	26.6
28	* 58.7	27.1	29.4	34.4	29.0	29.2	39.4	35.9	29.9	42.7	31.7	27.3
29	58.7	30.1	33.7	29.7	30.7	39.5	35.9	36.6	44.0	26.6	27.3	27.3
30	58.7	30.9	29.3	29.7	31.5	40.3	34.6	28.0	32.3	26.5	27.3	31.7
31	58.7	29.4			26.4	40.4	34.6		32.3			
Sum		1,264.8		870.7		2,659.0		1,525.9		900.9		856.8
		1,400.3		795.3		1,223.6		1,149.9		1,034.4		1,055.6

Month	Current Year 1947			Period 1931-1947			Acre-Feet				
	Extreme Gage Feet		High	Average Second-Feet		Total	Acre-Feet			Normal 1938-1947	
	High	Low		Day	Day		Acres	Acres	Acres		
Jan.	1.56	.59	18	112	6	23.1	45.2	2,780	3,955	7,070	934
Feb.	1.07	.54	411	61.7	420	20.8	45.2	2,510	2,800	5,490	487
Mar.	1.05	.50	18	57.6	4	17.5	25.7	1,580	2,509	4,190	1,120
Apr.	.95	.57	25	48.7	415	20.9	29.0	1,730	2,735	6,120	566
May	5.37	.40	10	1,060	31	11.1	39.5	2,430	3,755	6,700	1,770
June	14.33	.36	19	10,300	9	9.6	88.6	5,270	6,034	* 47,900	1,110
July	.96	.59	20	51.2	23.0	37.1	27.1	2,280	3,088	* 6,650	1,080
Aug.	5.86	.65	11	1,280	30	29.1	49.2	3,030	2,923	5,590	888
Sept.	3.52	.55	12	469	28	25.6	34.5	2,050	4,315	19,100	872
Oct.	2.89	.47	28	342	23	20.1	29.1	3,880	8,470	1,710	3,877
Nov.	3.35	.47	17	429	29	19.3	35.2	2,090	3,010	5,560	526
Dec.	.87	.46	31	48.6	2	18.6	27.6	1,700	3,058	5,820	496
Yearly				10,300		9.6	40.4	29,240	42,092	98,137	22,202
											35,520

* Estimated * Partly estimated + And other days

PINTO CREEK NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights, and concrete control dam, 0.6 mile below the Del Rio-Magdalena 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. Also a series of pipe gages (high stage indicating gages) 750 feet upstream from the gage well.

RECORDS: Based upon 15 meter measurements during the year and a stable rating curve. 1947 records good. Records available: November 1928 to December 31, 1947.

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. 54,650 second-feet on August 31, 1932 with a gage height of 21.08 feet. Min. sometimes dry.

Average Flow in Second-Feet

Daily:	Max.	24,380, Aug. 31, 1932.	Min.	sometimes dry.
Monthly:	Max.	792, Aug. 1932.	Min.	sometimes dry.
Yearly:	Max.	105, 1932.	Min.	1.8 1945.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	4.0	1.4	8.5	5.4	3.0	1.3	1.8	4.9
2	0	0	0	0	4.3	1.9	7.7	7.2	5.0	1.3	1.8	4.9
3	0	0	0	0	2.9	1.5	6.8	36.4	3.6	1.5	2.1	5.1
4	0	0	0	0	1.4	1.0	5.5	9.8	3.7	1.6	2.3	* 5.9
5	0	0	0	0	.8	.5	4.6	7.9	3.8	1.8	2.4	4.8
6	0	0	0	0	.4	.3	3.9	7.2	3.4	1.9	2.4	4.8
7	0	0	0	0	.2	.2	3.7	6.5	3.2	2.2	2.4	4.8
8	0	0	0	0	.1	.1	3.3	5.6	3.2	2.2	2.4	4.8
9	0	0	0	0	.1	.1	3.5	5.2	3.3	1.7	2.8	4.7
10	0	0	0	0	285	.1	3.1	5.1	3.3	1.5	3.4	4.7
11	0	0	0	0	70.3	.1	3.1	3.8	3.5	1.3	3.6	4.6
12	0	0	0	0	17.6	.1	3.3	9.2	5.3	1.1	3.6	4.6
13	0	0	0	0	7.0	.1	2.9	8.8	6.0	1.1	4.1	4.7
14	0	0	0	0	3.5	.1	3.0	5.8	4.5	1.2	4.5	5.2
15	0	0	0	0	2.8	.1	2.8	5.2	3.7	1.2	4.6	5.6
16	0	0	0	* .4	1,460	.2	2.6	5.1	3.6	* 1.2	4.4	5.0
17	0	0	0	* 1.1	66.5	.4	2.3	4.4	3.4	* 1.3	13.3	4.8
18	0	0	0	* 1.0	26.4	.7	2.6	3.9	2.4	1.3	7.1	4.6
19	0	0	0	* .9	13.0	450	649	3.9	2.3	1.5	4.5	4.6
20	0	0	0	* .9	9.0	16.4	38.5	3.9	2.1	1.6	4.5	4.4
21	0	0	0	* .9	8.0	19.9	14.2	6.4	2.0	1.5	4.9	4.4
22	0	0	0	* .9	7.2	10.8	9.1	28.7	2.2	1.3	5.1	4.5
23	0	0	0	* .7	12.8	13.0	7.0	17.4	2.0	1.3	5.1	4.5
24	0	0	0	* .4	11.3	21.7	6.0	8.8	1.8	1.3	5.1	4.4
25	0	0	0	* .3	1.4	1,410	5.2	5.8	1.9	1.4	5.3	4.4
26	0	0	0	* 2.6	1.1	81.7	5.2	4.5	1.8	1.6	5.6	4.4
27	0	0	0	* 8.6	.9	31.3	4.7	4.4	1.7	1.8	5.5	4.4
28	0	0	0	* 5.6	.7	17.3	4.3	4.2	1.7	2.0	5.1	4.3
29	0	0	0	* 5.6	.7	11.7	4.8	3.8	1.6	3.0	4.8	4.3
30	0	0	0	* 4.9	1.1	9.8	5.7	3.2	2.6	4.8	4.3	4.5
31	0	0	0		1.0	5.6	2.8	2.8	2.0			
Sum	0	0	* 34.8		2,102.5		240.3		49.6		145.9	
					2,021.5		832.5		88.5		129.3	

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Acre-Feet Normal 1938-1947
	High		Low	High	Low			Normal	Maximum	Minimum	
	High	Low	Day		Day	Day					
Jan.				0		0	0	425	2,110	0	210
Feb.				0		0	0	408	1,860	0	279
Mar.				0		0	0	518	2,500	0	295
Apr.	2.93		27	* 9.4	1.1	0	* 1.2	69.0	753	3,600	43.0
May	8.19		16	3,630	* 8	* 1	.65.2	4,010	2,509	20,500	28.0
June	9.26		25	5,240	* 8	* 1	70.1	4,170	2,352	30,000	0
July	8.34	2.55	19	3,830	17	2.3	26.9	1,650	2,944	30,000	0
Aug.	4.40	2.66	22	168	31	2.7	7.8	477	2,861	48,700	0
Sept.	3.02	2.49	12	7.7	30	1.5	3.0	176	1,839	17,300	0
Oct.	2.73	2.39	29	3.4	13	1.0	1.6	98.4	809	4,000	0
Nov.	3.61	2.49	17	31.6	2	1.7	1.3	256	368	2,150	0
Dec.	2.91	2.49	4	6.2	* 28	4.3	4.7	289	452	2,180	0
Yearly				5,240			0	15.5	11,195.4	16,238	# 76,259.3 #1,325.2
											9,845

* Estimated * Partly estimated # Partly estimated for the period 1924-1947 ♦ Period 1928-1947

‡ And other days

RIO SAN DIEGO AT JIMÉNEZ, 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 upon 1 meter measurement during the year and the weir discharge table. 1947 records good. Records available: 1922 to 1947. The records from 1922 to September 1932 are considered doubtful.

REMARKS: The weir control at this station was constructed in November 1932. The flow of this spring-fed stream is modified by two small storage reservoirs, San Miguel and Centenario in the Irrigation District of San Carlos, Coahuila, and by irrigation of Dolores Hacienda just above this station. One-fourth mile downstream from this gaging station, water was diverted for irrigating about 2,220 acres of land in the Jiménez community.

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.	1,960	May 1935.	Min.	18.7	April 1939.
Yearly:	Max.	526	1935.	Min.	37.8	1939.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	129	209	74.9	74.9	74.9	114	175	74.9	159	114	63.2	63.2
2	129	209	74.9	74.9	* 63.2	114	175	87.2	159	100	63.2	63.2
3	129	209	74.9	74.9	* 52.3	100	175	175	159	100	63.2	63.2
4	129	192	74.9	74.9	* 52.3	100	159	175	159	100	63.2	63.2
5	129	192	74.9	74.9	* 52.3	87.2	159	159	100	63.2	63.2	63.2
6	129	192	74.9	74.9	* 52.3	87.2	143	143	159	100	63.2	63.2
7	129	192	74.9	63.2	* 42.0	87.2	143	159	159	87.2	63.2	74.9
8	129	175	63.2	42.0	* 42.0	74.9	129	209	159	87.2	74.9	74.9
9	129	175	63.2	42.0	42.0	74.9	114	245	159	87.2	63.2	87.2
10	143	175	63.2	52.3	249	63.2	100	265	143	87.2	63.2	87.2
11	143	129	63.2	52.3	413	42.0	74.9	284	143	87.2	63.2	74.9
12	143	114	63.2	63.2	143	42.0	74.9	284	333	74.9	63.2	74.9
13	128	114	63.2	63.2	114	52.3	87.3	284	413	63.2	63.2	74.9
14	114	100	63.2	63.2	100	52.3	74.9	284	42.0	63.2	74.9	74.9
15	114	74.9	74.9	63.2	87.2	52.3	63.3	304	209	52.3	63.2	74.9
16	114	100	74.9	52.3	509	52.3	74.9	284	227	63.2	63.2	74.9
17	128	143	74.9	52.3	284	52.3	74.9	284	245	63.2	100	74.9
18	159	159	129	52.3	209	144	74.9	304	265	63.2	100	74.9
19	175	143	114	63.2	209	1,270	209	304	284	63.2	74.9	74.9
20	192	143	114	63.2	209	227	114	245	284	63.2	63.2	74.9
21	192	129	100	63.2	175	128	114	192	245	63.2	63.2	74.9
22	227	114	87.2	63.2	159	100	100	209	209	63.2	63.2	74.9
23	209	114	87.2	74.9	129	114	87.3	459	159	63.2	63.2	74.9
24	209	100	74.9	74.9	114	234	87.3	284	129	74.9	63.2	74.9
25	209	87.2	74.9	74.9	143	1,350	87.3	245	143	74.9	63.2	74.9
26	209	87.2	74.9	74.9	159	227	87.3	227	143	74.9	74.9	74.9
27	209	74.9	74.9	74.9	159	192	87.3	209	129	63.2	74.9	74.9
28	209	74.9	63.2	74.9	143	175	74.9	209	129	63.2	74.9	87.2
29	192	63.2	74.9	74.9	143	175	74.9	192	114	74.9	63.2	87.2
30	192	74.9	74.9	74.9	143	175	74.9	175	114	74.9	63.2	87.2
31	192	74.9	74.9	129			74.9	175		63.2		87.2
Sum			3,921.1	1,962.9		5,759.1	7,112.1		2,352.1		2,325.5	
4,963			2,398.6		4,595.5	3,345.1		5,775		2,028.1		

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1933-1947			Acre-Feet Normal 1938-1947	
	High		Low	#	Day			Normal	Maximum	Minimum		
	High	Low		#	Day	Day	Low					
Jan.	3.25	3.02	#	227	#	114	160	9,840	8,081	36,430	2,910	
Feb.	3.22	2.92	# 1	209	#	74.9	140	7,780	5,540	25,760	1,970	
Mar.	3.25	2.89	18	227	#	63.2	77.4	4,760	4,860	21,500	2,140	
Apr.	2.92	2.82	# 1	74.9	#	42.0	65.4	3,890	5,305	* 16,820	3,594	
May	4.86	2.82	16	1,280	#	42.0	148	9,120	* 14,961	* 120,200	1,290	
June	9.28	2.82	25	7,490	#	42.0	192	11,420	11,682	62,240	1,420	
July	3.90	2.89	19	696	#	63.2	108	6,640	9,043	34,150	8,067	
Aug.	3.94	2.92	23	724	# 1	74.9	229	14,110	7,901	19,950	1,210	
Sept.	4.95	3.02	12	1,350	#	114	192	11,450	* 17,418	* 84,620	2,120	
Oct.	3.02	2.82	1	114	14	42.0	75.9	4,670	22,985	8 146,640	1,950	
Nov.	3.15	2.85	17	175	3	52.3	67.6	4,020	13,828	8 68,290	1,960	
Dec.	2.95	2.89	#	87.2	# 1	63.2	75.0	4,610	9,016	8 45,160	2,060	
Yearly	9.28	2.82		7,490		42.0	128	92,310	130,620	* 381,720	27,460	
											98,454	

And other days * Partly estimated # Various days of the month @ Period 1932-1947

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 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 upon the 1942 rating table, the lower portion of which conforms to the weird table. The upper portion of the rating table is based upon meter measurements. 1947 records good. Records available: 1922 to 1947. The records from 1922 to September 1932 are considered doubtful.

REMARKS: This station was constructed in October 1932 at a point 1,640 feet upstream from Pasco de las Mulas. Zero of this gage was 884.22 feet above mean sea level. In December 1938, the station was moved 3,300 feet downstream to the present site. The flow of this stream is modified by irrigation diversions above and below 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 at the first station location. Min. frequently dry with a gage height of 0.0 feet.

			Average Flow in 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.	576,	1932.	Min.	10.2 1939

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	96.1	79.5	57.2	37.4	37.4	31.4	37.4	37.4	64.3	71.7	57.2	50.1
2	96.1	71.7	57.2	43.8	26.1	31.4	37.4	71.7	64.3	64.3	57.2	50.1
3	* 96.1	71.7	57.2	50.1	26.1	26.1	37.4	152	71.7	64.3	50.1	50.1
4	* 96.1	71.7	57.2	43.8	26.1	26.1	37.4	87.6	71.7	64.3	50.1	50.1
5	* 96.1	71.7	57.2	37.4	26.1	26.1	37.4	71.7	71.7	64.3	50.1	50.1
6	* 96.1	71.7	64.3	37.4	21.2	26.1	37.4	57.2	71.7	64.3	50.1	50.1
7	* 96.1	71.7	57.2	37.4	21.2	21.2	31.4	50.1	71.7	64.3	50.1	50.1
8	* 96.1	71.7	57.2	37.4	21.2	21.2	31.4	43.8	71.7	64.3	50.1	50.1
9	* 96.1	71.7	57.2	37.4	21.2	21.2	31.4	37.4	71.7	64.3	50.1	50.1
10	* 96.1	71.7	57.2	37.4	399	21.2	31.4	37.4	71.7	64.3	50.1	43.8
11	* 96.1	71.7	57.2	37.4	406	21.2	31.4	37.4	71.7	57.2	50.1	43.8
12	* 96.1	71.7	57.2	31.4	87.6	21.2	31.4	37.4	71.7	57.2	50.1	43.8
13	* 96.1	64.3	57.2	31.4	64.3	21.2	31.4	37.4	71.7	57.2	50.1	43.8
14	* 87.6	64.3	57.2	31.4	50.1	21.2	31.4	37.4	71.7	57.2	50.1	43.8
15	87.6	64.3	50.1	31.4	43.8	21.2	31.4	37.4	71.7	57.2	50.1	50.1
16	87.6	64.3	43.8	31.4	43.8	26.1	31.4	37.4	71.7	57.2	50.1	50.1
17	87.6	57.2	43.8	31.4	37.4	21.2	31.4	37.4	71.7	57.2	64.3	43.8
18	87.6	57.2	71.7	31.4	37.4	21.2	31.4	43.8	79.5	50.1	57.2	43.8
19	87.6	57.2	79.5	31.4	37.4	284	50.1	43.8	79.5	50.1	57.2	43.8
20	87.6	57.2	57.2	31.4	71.7	64.3	57.2	43.8	79.5	50.1	57.2	43.8
21	79.5	57.2	50.1	31.4	43.8	43.8	43.8	43.8	79.5	50.1	57.2	43.8
22	79.5	64.3	50.1	31.4	37.4	37.4	43.8	57.2	79.5	43.8	57.2	43.8
23	79.5	57.2	43.8	31.4	37.4	50.1	43.8	64.3	79.5	57.2	57.2	43.8
24	79.5	57.2	43.8	31.4	43.8	431	37.4	64.3	79.5	43.8	57.2	43.8
25	79.5	57.2	43.8	31.4	37.4	184	37.4	87.6	79.5	43.8	57.2	43.8
26	79.5	57.2	43.8	43.8	37.4	87.6	37.4	71.7	79.5	43.8	50.1	43.8
27	79.5	57.2	43.8	43.8	37.4	64.3	37.4	64.3	79.5	50.1	50.1	43.8
28	79.5	57.2	37.4	43.8	37.4	57.2	37.4	64.3	71.7	57.2	50.1	43.8
29	79.5	37.4	37.4	37.4	31.4	50.1	37.4	64.3	71.7	87.6	50.1	43.8
30	79.5	37.4	37.4	31.4	43.8	43.8	37.4	64.3	71.7	50.1	43.8	43.8
31	71.7	43.8	43.8	31.4	31.4	31.4	31.4	64.3	57.2			
Sum		1,818.9	1,082.7	1,824.1		1,749.9		1,794.0		1,427.1		

Current Year 1947								Period 1932-1947			Acre-Feet		
Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal	1938-1947		
	High	Low	Day	High	Low		Normal	Maximum	Minimum				
Jan.	.56	.46	1	*	96.1	31	71.7	* 88.0	* 5,410	3,791	14,850	171	2,835
Feb.	.49	.39	1	79.5	#	57.2	65.0	5,610	2,670	11,580	595	2,012	
Mar.	.62	.30	18	113	#	37.4	52.6	3,230	2,475	9,900	576	1,733	
Apr.	.46	.26	3	71.7	#	31.4	36.1	2,150	2,252	6,870	382	1,703	
May	4.07	.20	10	2,340	#	21.2	61.7	3,790	5,571	42,330	57.6	2,927	
June	2.29	.20	24	918	#	21.2	60.8	3,620	7,246	41,660	30.0	6,468	
July	.59	.26	19	105	#	31.4	36.6	2,250	3,942	12,170	0	3,947	
Aug.	1.12	.26	3	284	#	31.4	56.4	3,470	4,116	13,710	38.9	4,694	
Sept.	.49	.13	#	79.5	1	64.3	73.8	4,390	* 24,006	* 253,960	383	10,010	
Oct.	.69	.33	28	132	#	43.8	57.9	3,560	11,573	81,360	815	8,076	
Nov.	.46	.33	17	71.7	8	43.8	52.9	3,150	5,439	24,450	555	4,414	
Dec.	.36	.30	1	50.1	#	37.4	46.0	2,830	4,513	19,060	131	3,710	
Yearly	4.07	.20		2,340		21.2	57.3	41,460	* 77,594	* 414,310	7,436	52,529	

" Estimated * Partly estimated + And other days # Various days of the month

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 upon 141 meter measurements during the year, 129 by the Mexican and 12 by the United States Section of this Commission. Computations by shifting channel methods. 1947 records good. 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 1947.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. In April 1939 the operation and maintenance of this station was turned over from the United States Section to the Mexican Section of this Commission.

EXTREME FLOWS: The greatest recorded flow was on September 2, 1932, when the extreme gage height was 49.00 feet, discharge 569,000 second-feet. The lowest flow ever recorded was on June 25, 1945, when the extreme gage height was 1.31 feet and the extreme flow 597 second-feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,200	2,750	2,060	1,580	1,210	1,390	1,870	1,200	6,360	2,750	2,590	2,280
2	2,300	2,840	2,050	1,580	1,190	1,290	2,110	1,420	7,130	2,540	2,210	*2,250
3	2,260	2,920	2,150	1,580	1,170	1,240	1,990	2,220	7,630	2,430	1,900	*2,240
4	*2,240	2,720	2,130	1,500	1,110	1,160	1,910	1,790	8,650	2,440	1,760	*2,190
5	*2,130	2,680	2,030	1,540	1,080	1,090	1,740	2,030	7,630	2,290	1,550	*2,200
6	*2,130	2,630	2,070	1,490	1,040	1,050	1,910	1,590	6,820	2,140	1,470	*2,250
7	*2,150	2,470	2,030	1,430	964	1,050	1,750	1,440	5,510	2,150	1,380	2,260
8	2,190	2,330	1,940	1,390	961	1,010	1,480	1,340	5,090	2,150	1,390	2,370
9	*2,430	2,360	2,220	1,360	957	1,020	1,310	1,310	4,560	2,040	1,450	2,220
10	2,420	2,540	2,120	1,285	1,250	1,020	1,210	1,320	3,990	1,830	1,500	2,240
11	2,470	2,450	1,980	1,330	940	932	1,090	1,280	3,430	1,710	1,450	2,190
12	2,680	2,350	1,890	1,260	1020	862	1,060	1,670	8,300	1,640	1,550	2,040
13	2,740	2,390	1,820	1,260	130	858	1,060	1,490	20,480	1,480	1,590	2,000
14	2,640	2,330	1,830	1,190	3,460	2,570	1,020	1,260	8,690	1,510	1,640	2,060
15	2,490	2,260	1,780	1,130	3,080	2,240	1,030	1,200	6,750	1,470	1,640	2,110
16	2,540	2,400	1,780	1,080	5,790	1,540	989	1,180	* 6,140	1,420	1,720	2,160
17	2,700	2,490	1,780	1,090	4,510	1,360	1,030	1,270	6,140	1,420	2,070	2,070
18	3,180	2,530	2,300	1,110	3,130	1,110	1,030	2,170	6,180	1,740	2,370	1,920
19	3,390	2,460	2,400	* 1,050	3,080	12,540	3,230	5,590	5,400	1,560	2,190	1,920
20	3,240	2,410	2,710	* 1,040	2,770	3,850	3,180	3,570	5,160	1,790	2,070	1,920
21	2,970	2,360	2,010	* 1,030	2,790	1,830	1,990	2,720	5,050	1,740	2,060	1,880
22	2,770	2,460	1,880	* 1,080	2,190	1,640	1,650	2,510	4,770	1,570	2,050	1,850
23	2,740	2,400	1,950	* 1,080	1,910	1,590	1,250	3,030	4,520	1,480	2,090	1,830
24	2,830	2,460	2,010	1,070	2,040	6,390	1,240	2,380	4,270	1,430	2,130	1,840
25	2,930	2,340	1,990	1,490	1,890	14,060	1,040	2,280	4,030	1,370	2,010	1,840
26	2,870	2,150	1,970	1,820	1,880	4,590	964	3,960	3,670	1,320	2,040	1,840
27	2,870	2,100	1,980	1,440	1,970	4,270	950	6,460	3,500	1,310	2,090	1,850
28	2,950	2,100	1,810	1,390	1,780	2,850	964	6,040	3,330	1,300	2,250	1,800
29	2,730	1,750	1,310	1,650	2,520	929	7,030	3,150	1,550	2,300	1,850	1,850
30	2,750	1,690	1,230	1,470	2,270	933	6,960	2,910	1,560	2,350	1,960	1,960
31	2,730	1,630	1,410	1,410	982	6,220	1,350					
Sum		68,680	39,215		81,192		86,030		54,480		63,350	
81,640		61,700	76,882		44,891		179,240		56,860			

Current Year 1947

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total	Period 1924-1947			Acre-Feet Normal 1938-1947	
	High	Low	Day	Day			Normal	Maximum	Minimum		
	High	Low	Day	Day	Acre-Feet	Normal	Normal	Maximum	Minimum		
Jan.	3.48	2.53	18	3,740	5	1,930	2,630	161,900	182,825	365,000	104,400
Feb.	3.15	2.19	3	3,090	28	2,010	2,150	136,200	150,857	254,250	99,200
Mar.	3.18	1.97	20	3,110	31	1,410	1,990	122,400	147,674	247,440	95,900
Apr.	2.49	1.61	26	2,150	21	961	1,310	77,780	136,922	219,000	77,780
May	7.64	1.51	12	15,640	10	897	2,480	152,500	241,445	* 198,000	70,210
June	10.53	1.51	25	31,500	13	826	2,710	161,000	247,062	1,005,000	48,710
July	5.25	1.51	19	8,480	29	833	1,150	89,040	260,347	* 1,225,000	89,040
Aug.	5.25	1.67	27	8,020	16	1,020	2,780	170,600	282,816	* 947,000	86,400
Sept.	10.14	2.85	13	28,780	30	2,740	5,970	355,500	597,690	3,079,000	69,920
Oct.	2.99	1.87	1	2,990	28	1,230	1,760	108,100	450,504	1,680,300	108,100
Nov.	3.18	1.90	1	3,160	10	1,330	1,900	112,800	210,348	512,800	109,000
Dec.	2.69	2.23	8	2,430	25	1,750	2,040	125,700	181,573	369,760	105,620
Yearly	10.53	1.51		31,500		826	2,450	1,773,520	3,090,063	6,946,510	1,773,520
											2,889,254

* Estimated * 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 and 5.6 miles below the confluence of the Rio San Antonio. 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 upon 38 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: 1922 through 1947. The records from 1922 to September 1932 are considered doubtful.

REMARKS: This station was built in September 1932. 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. On September 2, 1932 backwater from the Rio Grande reached a gage height of 9.91 feet at this station. Min. .35 second-feet on November 4, 1934 with a gage height of .75 feet.

Average Flow in Second-Feet

Daily:	Max.	6,710, June 29, 1936.	Min.	0.7	frequently.
Monthly:	Max.	646, Oct. 1932.	Min.	1.0	Sept. 1945.
Yearly:	Max.	174, 1932.	Min.	11.0	1943.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.2	7.8	24.4	10.6	15.2	5.7	6.0	3.5	4.6	6.3	6.7	17.6
2	9.2	8.1	28.3	10.2	13.1	6.4	5.7	4.3	4.6	6.3	6.7	17.6
3	9.5	8.1	32.2	10.2	10.9	8.1	5.7	4.6	4.6	6.3	6.7	17.6
4	9.5	8.5	37.1	9.9	10.6	7.4	5.7	4.6	4.9	6.3	6.7	17.6
5	9.5	8.5	36.1	9.9	10.6	7.8	5.7	4.6	4.9	6.3	6.7	17.7
6	7.8	8.8	35.3	9.5	10.6	7.1	5.3	5.0	4.9	6.3	6.7	17.7
7	7.8	9.2	34.3	9.5	10.6	7.4	5.3	4.2	4.9	6.3	6.7	17.7
8	7.8	9.5	33.6	9.5	10.6	7.8	5.3	4.2	5.3	6.3	6.7	17.7
9	7.8	9.6	32.5	9.5	13.4	8.1	5.3	4.2	5.3	6.3	8.8	19.4
10	7.8	9.9	31.4	9.5	484	8.1	5.3	4.6	5.3	6.3	*22.6	19.4
11	7.8	9.9	30.7	9.5	682	6.7	4.9	4.6	5.3	6.4	18.7	19.4
12	7.8	9.9	29.7	9.2	108	3.5	4.9	4.6	5.3	6.4	15.2	19.4
13	7.8	9.9	29.0	9.2	62.2	3.5	4.9	5.0	5.6	6.4	18.4	19.4
14	7.8	9.5	27.9	9.2	26.8	3.5	4.9	5.0	5.6	6.4	21.9	17.7
15	7.4	9.5	26.9	9.2	19.1	5.7	4.9	5.0	5.6	6.4	31.8	13.1
16	7.4	9.5	25.8	9.2	15.9	6.7	4.9	5.0	5.7	6.4	21.5	13.1
17	7.4	9.5	24.7	9.2	19.1	8.5	4.9	5.3	5.7	6.4	21.2	13.1
18	7.4	9.5	23.7	9.2	13.4	8.5	4.6	5.3	5.7	6.4	19.4	13.1
19	7.4	9.2	19.4	9.2	13.4	8.5	4.6	5.3	6.0	6.4	19.4	13.1
20	7.4	9.2	18.4	9.2	11.3	8.5	3.9	5.0	6.0	6.4	19.4	13.1
21	7.4	9.2	17.7	9.2	9.5	8.5	3.2	5.0	6.0	6.4	17.7	13.1
22	7.4	9.2	16.6	9.2	9.5	8.5	3.2	4.6	6.0	6.4	17.7	13.1
23	7.4	8.8	15.9	9.2	7.8	8.5	3.2	4.6	6.0	6.4	17.3	13.1
24	7.4	8.8	14.9	9.6	7.8	8.1	3.2	4.2	5.7	6.7	17.3	13.1
25	7.4	*10.6	10.6	11.3	6.4	7.8	3.2	4.2	5.7	6.7	17.3	13.1
26	7.4	*12.4	10.6	22.6	6.4	7.4	3.2	4.2	5.7	6.7	17.3	13.1
27	7.4	*18.0	10.6	15.9	6.4	7.1	3.2	4.2	5.7	6.7	17.3	13.1
28	7.4	*20.5	10.6	15.9	5.3	6.7	3.2	4.2	5.3	6.7	17.3	13.1
29	7.8	10.6	15.5	5.3	6.4	3.2	4.2	5.3	6.7	17.3	13.1	13.1
30	7.8	10.6	15.5	6.4	6.0	3.5	4.6	5.3	6.7	17.3	13.1	13.1
31	7.8	10.6	5.3			3.5	4.6	6.7				
Sum		281.1	324.5	1,636.9	212.5	138.5	142.5	199.8	465.7	478.6		
	244.1	720.7										

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1932-1947			Acre-Feet Normal 1938-1947			
	High	Low	Day	High	Low			Normal	Maximum	Minimum				
Jan.	2.10	2.07	#	9.5	#	7.4	484	2,706	15,990	375	1,394			
Feb.	* 2.26	2.07	28	*	24.7	1	7.8	1,600	9,990	179	717			
Mar.	2.56	2.26	4	37.1	#	10.6	23.2	1,430	6,910	206	978			
Apr.	2.53	2.26	26	38.5	#	9.2	10.8	2,061	7,510	195	1,504			
May	8.63	2.20	10	2,740	#	5.3	52.8	3,250	4,040	23,850	494			
June	2.23	2.03	#	8.1	#	3.5	7.1	421	3,318	19,730	291			
July	2.17	2.10	1	6.0	#	3.2	4.5	275	1,786	9,290	106			
Aug.	2.13	2.10	#	5.3	1	3.5	4.6	283	1,795	14,530	77.8			
Sept.	2.10	2.10	#	6.0	#	4.6	5.4	322	2,559	14,340	57.5			
Oct.	2.10	2.10	#	6.7	#	6.4	6.4	396	4,045	39,790	117			
Nov.	2.92	2.10	9	* 51.6	#	6.7	15.5	924	2,500	25,590	101			
Dec.	2.59	2.43	#	19.4		12.0	15.4	949	2,557	20,720	260			
Yearly	8.63	2.03		2,740		3.2	13.7	9,936	30,438	126,090	7,969			
											15,352			

* Estimated * Partly estimated # Various days of the month + And other days

RIO GRANDE AT LAREDO, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car. Until May 22, 1942 the water-stage recorder was attached to the north abutment of the railroad bridge between Laredo, Texas, and Nuevo Laredo, Tamaulipas, 884.3 river miles below the American Dam at El Paso, Texas. On June 10, 1942 the water-stage recorder was installed on the downstream side of the first pier of the same bridge on the Mexican side. The elevation of the zero of the gage was not changed. Zero of the gage at the recorder is at elevation 351.51 feet. The cable is located 1.4 miles upstream from the railroad bridge. Zero of the gage at the cable is elevation 352.89 feet. All gage elevations are above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 159 meter measurements during the year. Computations by shifting channel methods. 1947 records good. 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 1947. 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 peak gage reading was 52.20 feet, and the discharge 335,000 second-feet. On June 27, 1945 a minimum flow of 572 second-feet was reached with a gage height of 3.54 feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,320	2,800	2,120	1,630	3,180	1,460	2,690	1,350	6,000	2,880	1,820	2,270
2	2,480	2,780	2,080	1,530	1,730	1,430	2,460	3,390	6,360	2,720	1,520	2,370
3	2,610	2,850	1,980	1,530	1,320	1,410	2,230	4,940	6,750	2,620	2,470	2,420
4	2,730	2,920	1,960	1,480	1,300	1,340	2,160	4,590	7,800	2,500	2,270	2,380
5	2,600	2,820	2,120	1,490	1,270	1,270	1,960	4,170	8,120	2,390	2,030	2,330
6	2,460	2,570	2,260	1,410	1,190	1,190	1,870	2,800	7,800	2,400	1,880	2,320
7	2,360	2,720	2,100	1,370	1,120	1,150	1,690	2,220	6,290	2,290	1,660	2,370
8	2,320	2,710	2,060	1,360	1,030	1,140	1,760	1,740	5,370	2,230	1,500	2,360
9	2,410	2,610	2,090	1,340	957	1,050	1,680	1,510	4,520	2,150	1,420	2,310
10	2,580	2,420	2,130	1,340	936	1,030	1,450	1,410	4,050	2,250	1,390	2,360
11	2,580	2,540	2,440	1,300	3,350	1,030	1,300	1,320	3,850	2,060	1,490	2,270
12	2,720	2,710	2,200	1,360	8,230	992	1,260	1,300	3,450	1,880	1,600	2,280
13	2,660	2,520	1,880	1,260	10,420	950	1,150	1,320	6,040	1,720	1,560	2,190
14	2,750	2,490	1,880	1,150	5,440	904	1,050	1,440	17,730	1,680	1,610	2,040
15	2,900	2,540	1,850	1,160	3,920	915	1,080	1,560	9,250	1,560	1,690	2,110
16	2,870	2,430	1,890	1,110	3,240	1,820	1,080	1,330	7,270	1,480	1,720	2,130
17	2,720	2,470	1,820	1,120	5,260	2,090	1,010	1,300	5,970	1,430	1,940	2,090
18	2,820	2,390	1,860	1,040	9,360	1,540	985	1,310	5,790	1,420	1,860	2,160
19	2,980	2,690	1,840	1,080	4,630	4,240	1,010	1,290	6,290	1,430	2,260	2,060
20	3,460	2,730	2,430	1,040	3,850	14,800	1,010	3,310	5,510	1,760	2,310	1,950
21	3,450	2,600	2,400	1,050	4,200	6,820	3,070	10,740	5,160	1,710	2,150	1,990
22	3,300	2,530	2,590	1,050	3,230	2,650	2,520	3,960	4,940	1,750	2,230	1,970
23	3,190	2,540	1,960	1,000	2,880	1,930	1,770	2,840	4,660	1,810	2,090	1,970
24	3,150	2,610	1,910	1,050	3,850	29,490	1,390	2,760	4,310	1,600	2,120	1,960
25	3,100	2,490	1,820	1,170	4,700	24,540	1,190	3,360	4,130	1,500	2,120	1,880
26	3,050	2,670	1,910	1,370	2,280	16,770	1,050	3,290	3,920	1,400	2,160	1,900
27	3,150	2,440	2,010	1,600	1,870	5,830	1,010	3,370	3,670	1,320	2,130	1,840
28	3,070	2,220	1,970	1,940	1,830	4,660	946	6,070	3,450	2,150	1,820	
29	3,070				1,920	1,580	1,900	3,600	929	6,250	3,300	4,270
30	2,950				1,800	1,460	1,710	2,910	936	7,130	3,080	3,710
31	2,830				1,750	1,540		1,080	7,310	2,010		1,860
Sum		73,030		39,310		140,451		100,680		63,220		65,590

87,640			63,030			101,723			46,776			174,810			57,580						
Current Year 1947									Period 1924-1947									Acre-Foot			
Month	Extreme Gage Feet			Extreme Second-Feet			Average Second-Feet	Total	Acre-Feet			Normal 1938-1947									
	High	Low	Day	High	Low	Day			Normal	Maximum	Minimum										
Jan.	5.54	4.82	20	3,670	8	2,260	2,830	173,800	183,929	351,700	113,600	175,500									
Feb.	5.35	4.92	4	3,020	28	2,150	2,610	144,780	151,372	237,400	99,400	146,400									
Mar.	5.31	4.63	22	3,000	13	1,580	2,030	125,000	147,323	223,000	95,700	135,290									
Apr.	4.92	3.90	30	2,310	23	975	1,310	77,970	144,625	312,000	77,970	136,657									
May	8.27	3.84	15	15,150	10	908	3,280	201,800	275,187	856,000	81,540	264,254									
June	17.39	3.74	24	55,800	14	876	4,680	278,600	287,469	1,357,000	46,850	240,455									
July	5.84	3.84	21	4,270	29	904	1,510	92,780	277,230	1,250,000	83,570	357,059									
Aug.	8.89	3.94	21	14,940	1	1,060	3,250	199,700	292,640	883,000	93,740	318,400									
Sept.	10.37	5.22	14	21,680	30	2,880	5,830	346,700	613,305	2,943,000	65,840	519,614									
Oct.	6.13	4.17	30	6,360	28	1,290	2,040	125,400	490,053	1,951,000	125,400	505,910									
Nov.	5.18	4.23	3	2,770	9	1,380	1,920	114,100	217,486	570,800	114,100	213,090									
Dec.	4.95	4.55	7	2,550	30	1,740	2,120	130,100	185,542	352,700	106,700	171,990									
Yearly	17.39	3.74		55,800		876	2,780	2,010,750	3,266,161	7,017,110	1,862,800	3,284,289									

RIO SALADO AT CD. GUERRERO, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and two reinforced concrete Cipolletti weirs, with a combined capacity of 636 second-feet. These weirs were constructed in December 1938. This station is 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 94.61 river miles below the American Dam at El Paso, Texas. Zero of the gage is 265.74 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 112 meter measurements during the year and the weir discharge records. Computations by shifting channel methods for flows greater than 636 second-feet. 1947 records good. Records available: 1900-1913 and 1923-1947.

REMARKS: This station was entirely rebuilt by the Mexican Section of this Commission in December 1932 when an automatic water-stage recorder was installed. Prior to 1932, 3 gage readings were made here daily. The flow of the Rio Salado is greatly modified by irrigation diversions above this station and by the Don Martin Reservoir, which forms a part of the irrigation system of the Rio Salado.

EXTREME FLOWS: The greatest recorded flow at this station was on September 7, 1933, when an extreme gage height of 18.86 feet was reached with a discharge of 43,800 second-feet. The stream is sometimes dry.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	22.2	20.5	20.5	18.3	9.9	38.1	119	170	162	88.3	63.2	28.6
2	24.4	20.5	18.3	18.3	9.9	31.2	88.3	6,040	143	75.6	45.9	24.4
3	28.6	18.3	18.4	18.3	886	24.4	169	9,570	124	66.0	33.2	24.4
4	33.2	18.3	16.6	16.6	625	20.5	162	10,630	113	150	26.5	26.5
5	33.2	16.6	18.3	16.6	331	16.6	103	13,240	108	441	24.4	26.5
6	33.2	16.6	16.6	18.4	156	12.7	72.4	15,820	113	84.0	24.4	26.5
7	33.2	16.6	14.5	18.4	92.9	11.3	51.6	11,900	149	57.2	24.3	28.6
8	31.1	16.6	12.7	16.6	60.0	9.9	105	5,260	113	51.6	24.4	28.6
9	33.2	18.3	14.5	14.5	43.4	8.5	149	2,310	108	45.9	24.4	26.5
10	35.7	18.3	14.5	14.5	31.1	6.7	88.3	1,560	88.3	45.9	24.3	26.5
11	38.1	18.3	16.6	12.7	24.4	5.3	60.0	1,160	79.8	45.9	24.4	26.5
12	38.1	16.6	16.6	12.7	348	3.9	40.6	900	75.6	43.4	24.4	28.6
13	43.4	18.4	22.1	11.3	876	3.9	31.1	717	6,040	43.4	24.3	40.6
14	40.6	16.6	31.1	12.7	410	3.9	26.5	590	1,270	40.6	22.2	35.7
15	38.1	18.4	33.2	12.7	204	1,340	26.5	509	498	40.6	22.2	43.4
16	35.7	20.5	31.1	12.7	124	530	28.6	441	565	38.1	22.2	38.1
17	38.1	22.2	31.1	12.7	212	26.5	399	1,63	35.7	1,028	35.7	
18	33.2	20.5	33.2	11.3	119	212	24.4	360	252	33.2	119	33.2
19	31.1	20.5	33.2	11.3	84.0	1,130	28.6	322	185	31.1	48.7	33.2
20	28.6	20.5	31.1	11.3	3,240	6,180	66.0	295	175	31.1	33.2	33.2
21	28.6	20.5	28.6	11.3	2,300	3,420	295	269	136	31.1	45.9	33.2
22	28.6	18.4	28.6	9.9	1,220	675	205	286	5,900	38.1	63.2	33.2
23	28.6	18.4	28.6	9.9	1,63	1,450	119	431	2,800	40.6	45.9	33.2
24	28.6	16.6	28.6	8.5	304	946	79.8	371	1,110	33.2	35.7	33.2
25	28.6	14.5	26.5	9.9	2,030	6,140	69.2	770	675	28.6	33.2	33.2
26	28.6	14.5	24.3	9.9	1,450	7,310	60.0	505	463	28.6	43.4	33.2
27	28.6	20.5	20.5	11.3	399	2,610	48.7	618	269	26.5	45.9	31.1
28	26.5	22.2	18.3	11.3	169	530	43.4	639	185	26.5	38.1	31.1
29	24.4		16.6	11.3	97.8	277	38.1	388	130	26.5	31.1	28.6
30	22.2		16.6	11.3	66.0	175	48.7	269	103	26.5	28.6	26.5
31	20.5		18.3		48.7		66.0	204		35.7		26.5
Sum-	518.7		396.5		33,333.9		86,943		1,830.5		958.3	
	966.8		699.7		16,474.1		2,537.3		22,591.7		2,094.6	

Current Year 1947

Period 1924-1947

Acre-Feet

Month	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet			Normal 1938-1947	
	High	Low	Day	Day			Normal	Maximum	Minimum		
	High	Low	Day	Day	Normal	Maximum	Minimum	Normal	Maximum		
Jan.	2.13	1.77	13	45.9	31	20.5	31.2	1,920	15,518	144,110	0
Feb.	1.80	1.67	428	22.2	425	14.5	1,030	10,859	98,520	0	2,710
Mar.	2.00	1.64	18	35.7	48	12.7	22.6	1,390	11,166	95,740	52.0
Apr.	1.77	1.54	1	20.5	424	8.5	13.2	786	12,225	54,500	56.4
May	8.33	1.57	20	4,630	41	9.9	531	32,680	43,783	* 253,000	3,200
June	10.73	1.44	20	9,250	412	5.9	1,110	66,120	39,236	192,000	1,620
July	3.81	1.80	21	371	18	22.2	81.8	5,030	19,200	100,000	228
Aug.	.14.07	2.10	6	17,060	1	43.4	2,800	172,500	33,650	260,180	81.0
Sept.	11.68	2.46	22	11,020	12	75.6	753	44,810	91,956	600,000	3,310
Oct.	4.79	1.84	5	738	30	24.4	59.0	3,630	69,530	673,070	1,710
Nov.	8.76	1.80	17	4,980	\$14	22.2	69.8	4,150	24,218	248,590	246
Dec.	2.23	1.84	13	54.4	2	24.4	30.9	1,900	17,182	198,160	46.0
Yearly	14.07	1.44		17,060		3.9	464	335,946	388,523	1,350,260	101,770
	*	Partly estimated		4	And other days						249,403

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 Gue-rerro, Tamaulipas, 1.4 miles below the confluence of the Rio 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 upon 56 meter measurements during the year, 44 by the United States and 12 by the Mexican Section of this Commission. Computations by shifting channel methods. 1947 records good. Records available: January 1932 to December 31, 1947.

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 extreme gage height was 262.07 feet and the extreme flow was 261,000 second-feet. The lowest flow recorded was on June 29, 1945, when the extreme gage height was 219.28 feet and the extreme flow 639 second-feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,280	3,000	2,190	1,790	1,880	1,610	* 3,010	1,420	* 6,960	3,180	2,040	2,330
2	2,310	3,020	2,160	1,670	3,310	1,520	* 2,750	12,800	* 6,200	2,990	1,870	2,410
3	2,420	3,010	2,140	1,650	2,670	1,470	* 2,520	20,500	* 6,300	2,780	1,580	2,450
4	2,530	3,060	2,090	1,570	2,030	1,350	* 2,300	21,700	* 6,800	2,720	2,590	2,460
5	2,620	3,060	2,060	1,520	1,710	1,310	* 2,270	21,300	7,100	2,970	2,250	2,400
6	2,530	3,000	2,210	1,550	1,440	1,190	* 2,030	21,900	8,460	2,550	2,000	2,390
7	2,440	2,810	2,220	1,500	1,290	1,150	* 1,860	15,500	7,280	2,410	1,860	2,340
8	2,370	2,830	2,130	1,450	1,170	1,100	* 1,710	8,110	5,880	2,270	1,670	2,360
9	2,410	2,780	2,160	1,420	1,030	1,050	* 1,860	4,270	4,990	2,140	1,540	2,400
10	2,540	2,620	2,170	1,360	887	1,020	* 1,760	3,260	4,450	2,120	1,450	2,370
11	2,590	2,480	2,110	1,360	3,480	1,010	1,500	2,700	4,130	2,150	1,420	2,450
12	2,630	2,580	2,310	1,360	5,930	986	1,370	2,340	3,880	2,110	1,440	2,410
13	2,770	2,780	2,190	3,820	8,540	949	* 1,300	2,110	9,160	1,960	1,570	2,440
14	2,620	2,620	1,860	1,800	9,250	894	* 1,180	1,940	17,000	1,900	1,550	2,380
15	2,730	2,540	1,940	1,290	4,850	1,850	* 1,120	1,910	14,100	1,790	1,560	2,190
16	2,930	2,570	1,910	1,210	3,970	1,630	* 1,120	2,110	8,120	1,710	1,760	2,130
17	2,830	2,490	1,920	1,160	3,890	2,170	* 1,110	1,880	7,460	1,650	3,470	2,160
18	2,710	2,480	1,880	1,100	7,190	2,410	1,080	1,760	6,020	1,580	2,470	2,130
19	2,830	2,600	1,850	1,080	7,020	3,920	997	1,640	5,720	1,540	1,900	2,160
20	2,950	2,680	1,850	1,080	7,460	16,200	1,020	1,530	5,630	1,500	2,270	2,080
21	3,480	2,660	2,480	1,080	6,400	18,100	1,220	9,170	4,870	1,720	2,350	1,950
22	3,340	2,540	2,570	1,040	5,290	6,020	3,120	9,060	10,200	1,730	2,280	1,950
23	3,230	2,500	2,720	1,020	3,610	3,760	2,590	4,540	8,420	1,770	3,430	1,950
24	3,080	2,470	2,170	995	3,320	* 12,000	1,900	3,650	6,030	1,850	2,380	1,880
25	3,070	2,500	2,040	1,040	5,750	* 35,600	1,520	4,350	4,970	1,660	2,190	1,900
26	3,010	2,400	1,940	1,130	6,740	* 30,500	1,320	7,410	4,560	1,600	2,290	1,890
27	3,060	2,520	2,030	1,430	3,120	* 18,400	1,140	4,380	4,240	1,500	2,200	1,910
28	3,100	2,330	2,020	1,560	2,370	5,810	1,060	4,730	3,860	1,430	2,170	1,880
29	3,100	2,020	2,080	1,950	4,730	1,010	6,990	3,620	1,600	2,170	1,860	
30	3,120	1,990	1,650	2,010	3,730	1,050	6,550	3,400	5,660	2,180	1,850	
31	3,020	1,940	1,830	1,830	1,830	1,380	6,910	3,350	6,910	1,830		
Sum	74,930	43,745			*183,439		218,420		67,890		67,230	
	86,650	65,270			125,387		* 51,177		199,790		61,900	

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1932-1947			Acre-Feet 1938-1947
	High	Low	Day	High	Day			Normal	Maximum	Minimum	
Jan.	221.21	220.69	21	3,530	1	2,200	2,800	172,000	198,923	* 484,450	119,000
Feb.	221.03	220.67	4	3,160	11	2,370	2,680	149,000	162,949	* 361,350	111,000
Mar.	220.93	220.36	23	2,970	14	1,730	2,110	129,000	167,442	* 292,000	110,000
Apr.	222.17	219.73	13	6,840	24	936	1,460	86,800	153,736	233,000	86,800
May	223.67	219.69	13	12,600	10	841	4,040	249,000	316,803	682,000	89,900
June	229.99	219.59	25	42,300	15	827	* 6,110	* 364,000	345,279	1,517,000	59,000
July	221.30	219.68	22	3,960	19	975	* 1,650	* 102,000	338,812	1,238,000	92,300
Aug.	225.75	219.96	6	23,700	1	1,250	7,050	433,000	325,086	* 721,000	108,000
Sept.	225.78	221.08	14	24,000	30	3,320	6,660	396,000	808,098	2,895,330	76,400
Oct.	222.02	220.10	30	6,200	28	1,390	2,190	135,000	628,359	2,396,440	135,000
Nov.	222.48	220.13	17	7,850	11	1,360	2,060	123,000	244,846	748,020	123,000
Dec.	220.78	220.42	13	2,530	31	1,780	2,170	133,000	205,135	591,380	116,000
Yearly	229.99	219.59		42,300		827	3,410	2,471,800	3,895,468	8,038,070	2,231,000
											3,583,770

* Partly estimated

RIO ALAMO AT CD. MIER, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and re-inforced concrete weir for measurement of flows up to 177 second-feet, located about 3.1 miles above the confluence of the Rio 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 upon 10 meter measurements at high flows during the year and the weir discharge tables at low flows. High flow computations by shifting channel methods. 1947 records good.

Records available: July 1, 1923 to December 31, 1947.

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. 76,600 second-feet on September 7, 1933, with a gage height of 26.90 feet. Min. dry in all years of record except 1934 and 1935.

			Average Flow in Second-Feet			
Daily:	Max.	42,020	Sept. 7, 1933.	Min.	frequently dry.	
Monthly:	Max.	3,200	Sept. 1933.	Min.	frequently dry.	
Yearly:	Max.	505	1944.	Min.	16.6	1929.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	24.7	6.0	6.0	4.2	0	6.0	4.2	42.4	94.3	8.1	2.5	15.9
2	24.7	6.0	6.0	4.2	0	6.0	4.2	1,380	21.5	8.1	2.5	13.1
3	24.7	6.0	6.0	4.2	0	6.0	4.2	1,660	10.6	8.1	2.5	15.9
4	24.7	6.0	6.0	4.2	0	4.2	2.4	5,750	8.1	8.1	2.5	15.9
5	24.7	6.0	6.0	4.2	0	4.2	2.4	5,190	6.0	6.0	2.5	15.9
6	24.7	6.0	6.0	4.2	0	2.5	2.4	2,830	6.0	8.1	2.5	15.9
7	24.7	6.0	6.0	4.2	0	2.5	2.4	1,250	4.2	10.6	2.5	15.9
8	24.7	6.0	6.0	6.0	0	2.5	2.5	597	4.2	8.1	2.5	15.9
9	27.9	6.0	4.3	6.0	0	2.5	2.5	381	4.2	6.0	2.5	15.9
10	27.9	6.0	4.3	6.0	0	2.5	2.5	239	4.2	4.2	2.5	15.9
11	27.9	6.0	4.3	6.0	0	1.1	2.5	179	2.5	4.2	2.5	15.9
12	24.7	6.0	6.0	4.2	0	0	1.1	153	2.5	4.2	2.5	15.9
13	21.5	8.2	6.0	4.2	0	0	1.1	131	1,942	4.2	2.5	15.9
14	15.9	8.2	6.0	4.2	0	6.0	1.1	109	660	4.2	2.5	15.9
15	13.1	6.0	6.0	2.5	0	43.8	0	94.3	84.8	4.2	2.5	15.9
16	10.6	6.0	4.2	2.5	0	94.3	0	195	89.7	4.2	2.5	15.9
17	10.6	6.0	4.2	2.5	29.0	18.7	0	126	40.6	4.2	2.5	15.9
18	10.6	6.0	4.2	2.5	74.2	84.8	0	51.2	40.6	8.1	2.5	15.9
19	10.6	6.0	4.2	2.5	89.7	1,110	0	31.4	18.7	1,229	2.5	18.7
20	10.6	6.0	4.2	2.5	1,240	629	0	21.5	13.1	172	2.5	15.9
21	10.6	6.0	4.2	2.5	1,165	671	0	31.4	10.6	63.2	2.5	15.9
22	10.6	6.0	4.2	2.5	477	137	0	15.9	1,674	24.7	2.5	15.9
23	10.6	6.0	4.2	1.1	80.5	1,590	0	13.1	656	13.1	4.2	15.9
24	10.6	6.0	4.2	1.1	38.1	178	0	13.1	84.8	10.6	4.2	15.9
25	10.6	6.0	4.2	1.1	770	131	0	59.0	31.4	8.1	29.0	15.9
26	10.6	6.0	4.2	1.1	236	104	0	165	18.7	6.0	540	13.1
27	8.1	6.0	4.2	1.1	59.0	37.1	0	33.9	13.1	6.0	67.1	13.1
28	8.1	6.0	2.5	1.1	31.4	15.9	0	21.5	10.6	4.2	27.9	13.1
29	6.0		2.5	1.1	18.7	8.1	14.8	13.1	10.6	4.2	18.7	13.1
30	6.0		2.5	0.0	10.6	4.3	54.7	10.6	8.1	4.2	15.9	13.1
31	6.0		4.2		8.1	10.6	37.1		2.5			13.1
Sum	172.4		93.7		4,903.0			26,824.5	1,660.7			476.1
	507.3		147.0		4,327.3			115.6	5,555.7	762.0		

Month	Current Year 1947			Total Acre-Feet	Period 1924-1947			Acre-Feet Normal 1938-1947	
	Extreme Gage Feet		High	Extreme Second-Feet		Average Second- Feet	Normal		
	High	Low		Day	High				
Jan.	1.71	1.44	#	27.9	429	6.0	16.4	1,010	
Feb.	1.48	1.44	#	8.1	4 1	6.2	342	3,507	
Mar.	1.44	1.38	\$ 1	6.0	428	2.5	4.7	2,196	
Apr.	1.48		#	8.1	30	0	3.1	5,997	
May	5.58		20	2,350	\$ 1	0	140	8,580	
June	6.50		23	3,080	\$ 12	0	163	9,730	
July	2.59		29	148	\$ 15	0	3.7	229	
Aug.	10.07	1.44	5	8,090	#	6.0	865	53,210	
Sept.	7.09	1.38	13	3,850	\$ 11	2.5	185	17,924	
Oct.	5.91	1.38	19	2,680	\$ 31	2.5	53.6	15,098	
Nov.	4.63	1.38	26	1,360	\$ 1	2.5	25.4	83,240	
Dec.	1.61	1.54	\$ 19	18.7	\$ 2	15.1	15.4	8,576	
Yearly	10.07			8,090		0	125	90,343	
							129,774	366,826	
								11,908.7	
								120,568	

* Partly estimated \$ And other days # Various days of the month

RIO GRANDE AT ROMA, TEXAS

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

RECORDS: Based upon 174 meter measurements during the year from bridge. Computations by shifting channel methods. 1947 records good. 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 1947. Gage height records are available for January, February, and March 1914.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. This station was operated by the Mexican Section until March 1929, when operation and maintenance was begun by the United States Section. On August 1, 1939, the operation and maintenance of this station was again turned over to the Mexican Section of this Commission. Backwater from the Rio San Juan sometimes reaches this station.

EXTREME FLOWS: The greatest recorded flow was on September 5, 1932, when the extreme gage height was 35.4 feet and the extreme flow 203,000 second-feet. The lowest flow ever recorded was on June 30, 1945, when the extreme flow was 618 second-feet at a stage of -1.02 feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,420	2,950	2,350	1,840	1,530	1,730	3,270	1,380	6,920	3,240	2,590	2,130
2	2,440	2,950	2,240	1,730	1,920	1,570	2,890	16,280	5,720	3,020	1,910	2,260
3	2,420	2,950	2,250	1,640	2,710	1,480	2,750	28,070	6,040	2,850	1,770	2,330
4	2,520	3,000	2,190	1,620	2,350	1,420	2,520	28,820	5,900	2,640	1,760	2,360
5	2,620	3,040	2,090	1,580	1,880	1,330	2,230	26,940	7,240	2,790	2,650	2,300
6	2,670	3,110	2,130	1,500	1,590	1,270	2,130	24,010	8,050	2,840	2,220	2,230
7	2,540	2,880	2,270	1,450	1,410	1,180	1,970	18,190	7,950	2,480	1,990	2,200
8	2,450	2,770	2,270	1,430	1,180	1,090	1,810	11,940	6,360	2,420	1,860	2,170
9	2,390	2,730	2,190	1,410	1,130	1,010	1,720	5,970	5,260	2,180	1,710	2,240
10	2,500	2,590	2,190	1,350	1,070	1,000	1,840	4,060	4,520	2,030	1,560	2,260
11	2,570	2,490	2,190	1,300	1,120	985	1,660	3,080	4,340	2,000	1,470	2,280
12	2,580	2,440	2,190	1,250	3,180	943	1,450	2,540	4,030	2,080	1,410	2,380
13	2,620	2,610	2,300	1,500	7,520	908	1,330	2,210	6,750	1,940	1,410	2,440
14	2,730	2,750	2,140	3,360	10,770	964	1,260	2,030	12,220	1,820	1,470	2,380
15	2,680	2,540	1,860	1,515	6,320	2,590	1,140	1,860	16,950	1,730	1,490	2,320
16	2,890	2,500	1,880	1,230	4,130	2,250	1,070	2,330	10,380	1,640	1,550	2,170
17	2,930	2,460	1,820	1,120	3,780	1,650	1,000	2,200	8,090	1,580	3,400	2,130
18	2,840	2,480	1,860	1,035	4,200	2,240	1,000	1,900	6,640	1,550	4,030	2,150
19	2,850	2,610	1,860	1,050	8,480	6,780	975	1,680	6,110	4,380	2,360	2,170
20	3,030	2,700	1,850	1,060	10,280	11,800	943	1,520	6,600	2,180	1,920	2,200
21	3,260	2,690	1,980	1,050	7,700	20,240	939	1,990	6,180	1,540	2,330	2,040
22	3,600	2,710	2,420	1,040	6,780	9,960	1,420	11,270	9,640	1,750	2,370	1,960
23	3,520	2,590	2,500	1,050	4,270	6,320	3,030	5,720	11,940	1,660	2,570	1,970
24	3,390	2,600	2,310	1,050	3,570	4,030	2,230	3,920	7,170	1,720	3,260	1,980
25	3,220	2,620	1,980	1,030	8,480	29,980	1,720	3,740	5,440	1,750	2,150	1,900
26	3,100	2,640	1,960	1,050	8,830	33,830	1,410	6,290	4,840	1,610	3,270	1,900
27	2,990	2,550	1,870	1,240	4,660	* 24,330	1,270	4,410	4,410	1,540	2,290	1,890
28	3,110	2,600	1,980	1,470	2,720	* 8,260	1,130	3,920	3,990	1,470	2,160	1,930
29	3,180	1,970	1,450	2,190	* 4,910	1,020	5,400	3,640	1,360	2,130	1,890	
30	3,160	1,960	1,805	2,010	* 4,450	1,090	5,970	3,410	2,660	2,090	1,850	
31	3,060	1,950		1,980		1,140	6,250		4,980		1,820	
Sum	75,550	42,205	190,500		245,890		69,430		66,230			
	88,280	65,020	129,740		51,357		206,730		65,150			

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total	Acre-Feet			Normal 1938-1947		
	High	Low	Day	High	Low			Acre-Feet	Normal	Maximum	Minimum		
Jan.	1.54	.62	22	3,640	1	2,380	2,850	175,100	212,237	467,400	119,500	180,440	
Feb.	1.12	.56	6	3,150	12	2,360	2,700	149,900	173,643	349,000	108,400	148,110	
Mar.	.95	.07	23	2,750	15	1,760	2,100	129,000	174,645	325,500	99,000	161,980	
Apr.	2.43	.62	14	4,730	25	1,030	1,410	83,710	170,331	285,000	83,710	148,591	
May	6.69	.72	20	13,700	11	968	4,190	257,300	356,925	706,300	91,320	355,522	
June	12.27	.69	25	38,490	13	908	6,350	377,900	375,405	1,586,000	53,990	308,679	
July	2.20	-.33	1	3,640	29	1,020	1,660	101,900	331,130	1,217,000	94,100	391,980	
Aug.	11.58	-.07	3	31,680	1	1,250	7,930	487,700	351,588	* 904,000	109,400	421,950	
Sept.	7.94	1.54	15	19,810	30	3,360	6,890	410,000	743,127	3,048,000	69,900	630,260	
Oct.	3.84	-.16	19	7,800	30	1,350	2,240	137,700	594,948	2,372,000	137,700	586,110	
Nov.	3.12	-.13	17	6,500	13	1,380	2,170	129,200	250,678	736,000	126,800	224,560	
Dec.	.79	.16	13	2,490	31	1,740	2,140	131,400	212,163	565,100	114,000	176,560	
Yearly	12.27	-.72		38,490		908	3,550	2,570,810	3,947,120	8,098,000	2,227,000	3,734,722	

[#] Estimated * Partly estimated

CONTRIBUTIONS FROM RIO SAN JUAN

Above Rio Grande City Station

DESCRIPTION: Contributions from the Rio San Juan all pass through the Marte Gómez (El Azicar) Reservoir and reach the Rio Grande between the Roma and the Hidalgo gaging stations. Marte Gómez Dam is located on the Rio San Juan 12.4 river miles above the confluence with the Rio Grande. This confluence 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 zero of the reservoir gage is 7.64 feet above mean sea level, U.S.C. & G.S. datum. The flow reported here 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.

RECORDS: Based upon meter measurements and weir and spillway discharge curves. Records furnished by the Ministry of Hydraulic Resources. 1947 records good. Records available: March 10, 1943 to December 31, 1947.

REMARKS: In 1947, 115,930 acre-feet of water were used from the reservoir to irrigate about 32,950 acres of land in the Lower Rio San Juan Irrigation District, nearly 10,000 acres of which produced two crops during the year. From August 7 to September 10 and from September 14 to 20, 108,600 acre-feet passed over the spillway of the dam.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.6	4.6	4.6	4.6	4.6	4.6	14.8	4.6	1,520	6.4	4.9	5.0
2	4.6	4.6	4.6	4.6	4.6	4.6	11.3	4.6	1,490	15.2	5.7	4.9
3	4.6	4.6	4.6	4.6	11.7	8.8	13.1	15.2	1,430	13.8	14.5	4.9
4	4.6	4.6	4.6	4.6	9.5	8.8	30.7	15.2	1,430	6.4	12.7	4.9
5	4.6	10.2	5.6	4.6	9.5	14.8	38.1	20.8	1,145	8.1	12.0	5.0
6	4.6	10.2	5.6	4.6	4.6	14.5	33.9	16.6	858	14.5	9.2	7.1
7	4.6	14.8	7.4	5.7	4.6	15.2	25.8	851	720	10.2	13.1	6.0
8	4.6	15.9	4.6	8.1	8.5	15.2	15.2	1,630	579	6.4	14.5	5.0
9	4.6	18.7	4.6	7.8	8.8	15.2	10.6	1,730	291	9.2	8.5	5.0
10	4.6	19.1	5.6	7.4	4.6	15.2	18.0	1,910	77.3	6.7	6.0	9.9
11	4.6	7.1	4.6	5.7	18.7	23.7	10.6	2,050	6.7	18.4	4.9	6.0
12	9.9	7.1	4.6	9.2	10.2	17.0	10.2	2,050	7.1	26.8	4.9	5.0
13	9.9	8.8	5.6	12.0	10.2	15.2	26.1	2,060	10.2	20.8	4.9	5.0
14	16.2	11.7	5.3	8.5	12.4	15.5	7.4	1,920	86.9	11.7	4.9	4.9
15	16.2	7.4	5.3	10.6	11.7	12.4	4.6	1,930	308	9.9	4.9	4.9
16	13.4	17.0	4.6	11.6	18.7	12.7	4.6	1,930	441	9.9	4.9	4.9
17	13.4	17.0	6.3	5.7	7.1	12.7	4.6	1,920	431	7.1	4.9	4.9
18	8.8	8.5	4.6	5.7	4.6	13.1	6.4	1,910	290	14.5	4.9	4.9
19	13.4	11.7	7.1	5.7	4.6	42.0	6.4	1,910	289	17.3	17.0	5.0
20	15.2	12.7	5.6	6.0	18.7	12.7	10.6	1,920	156	16.6	14.8	5.0
21	12.0	12.0	7.1	6.0	8.8	12.7	6.0	1,770	14.1	11.7	4.9	6.7
22	7.1	6.0	6.3	7.8	8.1	15.2	6.0	1,740	10.9	9.9	7.1	7.8
23	6.0	8.5	4.6	8.8	8.1	7.4	6.0	1,710	10.9	6.4	4.9	6.7
24	6.0	10.6	6.3	8.1	7.1	7.8	7.1	1,630	8.8	4.9	4.9	5.0
25	21.9	10.9	6.3	10.9	4.6	8.8	6.0	1,630	11.7	4.9	5.3	4.9
26	21.9	5.7	6.0	8.1	4.6	12.4	5.7	1,650	7.1	4.9	5.3	4.9
27	11.6	5.7	7.1	4.6	4.6	18.7	5.7	1,640	10.6	4.9	5.3	5.0
28	4.6	6.0	7.1	4.6	4.6	23.7	4.6	1,600	8.8	4.9	5.3	7.1
29	4.6	7.4	4.6	4.6	4.6	18.0	4.6	1,570	7.4	4.9	5.3	9.2
30	4.6	5.7	4.6	4.6	4.6	14.1	4.6	1,530	4.9	4.9	5.3	8.8
31	4.6	4.6	4.6	4.6	4.6	4.6	4.6	1,520	4.9	4.9	4.9	6.0
Sum	271.9	281.7	173.9	205.4	252.2	433.0	363.9	43,788.0	11,661.4	225.7	180.3	

Current Year 1947

Period 1943-1947

Month	Extreme Gage Feet #			Extreme Second-Feet *		Average Second-Feet	Total Acre-Feet	Acre-Feet **		
	High		Low	Day	Day			Average	Maximum	Minimum
	High	Low	Day	Day	Day	Day	Day	Average	Maximum	Minimum
Jan.	242.55	242.09	#	21.9	#	4.6	8.8	539	20,156	46,150
Feb.	242.09	240.88	10	19.1	#	4.6	10.1	559	11,821	25,590
Mar.	240.85	239.73	#	7.4	#	4.6	5.6	345	2,822	7,390
Apr.	240.32	239.17	13	12.0	#	4.6	6.8	407	2,490	9,340
May	239.83	238.94	#	18.7	#	4.6	8.1	500	1,765	4,030
June	240.03	238.22	19	42.0	#	4.6	14.4	859	12,276	* 41,390
July	239.70	237.47	5	38.1	#	4.6	11.7	722	15,354	* 66,820
Aug.	251.18	237.47	13	2,060	#	4.9	1,410	86,850	129,777	* 557,800
Sept.	250.89	250.06	1	1,520	30	4.9	389	23,130	136,636	* 653,300
Oct.	250.06	249.51	12	26.8	#	4.9	10.2	629	129,206	* 333,900
Nov.	249.77	249.08	19	17.0	#	4.9	7.5	448	19,814	* 50,270
Dec.	249.15	249.05	10	9.9	#	4.9	5.8	358	9,881	38,360
Yearly	251.18	237.47		2,060		4.6	159	115,346	491,998	* 1,717,159
										67,831

* Mean daily # Period 1944-1947 * Deduced from Roma and Rio Grande City discharges ** Combined with record of Rio San Juan below Marte Gómez Dam # Various days of the month ## Water surface elevations in Marte Gómez Reservoir

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 miles below the confluence of the Rio 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 upon 106 meter measurements during the year, 95 by the United States and 11 by the Mexican Section of this Commission. Computations by shifting channel methods. 1947 records fair. 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 1947.

REMARKS: Reservoirs, diversions, and drainage returns modify the river flow at this station. When the water at this station rises above a gage height of about 149.20 feet, water overflows the left river bank beyond the station cable, but such water is measured.

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. The 1932 flood was the greatest since that of August 30, 1909 which reached a stage here of between 157.8 and 159.1 feet.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,240	2,950	2,380	1,870	1,700	1,990	* 3,760	1,370	8,080	3,640	3,980	*2,200
2	2,250	2,920	2,260	1,780	1,520	1,860	* 2,990	9,490	7,640	3,390	2,260	*2,240
3	2,300	2,930	2,220	1,700	2,640	1,710	2,920	24,100	6,810	3,150	1,980	*2,320
4	2,380	2,920	2,230	1,650	2,360	1,600	2,600	31,800	6,860	2,920	1,720	*2,360
5	2,520	2,970	2,290	1,580	1,970	1,490	2,330	30,200	7,790	2,810	2,240	*2,360
6	2,660	2,990	2,340	1,490	1,720	1,430	2,150	25,200	8,280	3,060	2,350	*2,300
7	2,620	2,910	2,300	1,470	1,470	1,340	2,040	20,900	8,730	2,610	2,060	*2,280
8	2,540	2,710	2,280	1,470	1,290	1,270	1,880	15,300	7,640	2,400	1,960	*2,320
9	2,460	2,660	2,290	1,420	1,180	1,150	1,720	9,520	6,170	2,250	1,800	*2,290
10	2,490	2,600	2,290	1,390	1,030	1,030	1,770	6,740	5,220	2,130	1,680	*2,310
11	2,560	2,570	2,230	1,350	1,000	1,030	1,770	5,440	* 4,560	2,070	1,590	*2,260
12	2,610	2,500	2,220	1,350	2,310	1,010	1,570	1,690	* 4,260	2,030	1,520	*2,290
13	2,630	2,550	2,280	3,800	5,510	976	1,370	4,150	* 4,540	2,100	1,520	2,310
14	2,730	2,660	2,240	3,780	9,410	952	1,240	3,680	* 11,700	1,960	1,590	2,290
15	2,710	2,630	2,070	2,410	9,230	2,340	1,180	3,430	* 17,300	1,880	1,590	2,290
16	2,740	2,620	1,980	1,450	5,240	2,080	1,180	3,300	* 12,300	1,810	1,580	2,220
17	2,920	2,580	1,980	1,230	4,210	2,070	1,030	1,370	8,620	1,720	1,800	2,190
18	2,860	2,190	1,920	1,150	3,790	1,750	1,020	3,620	7,600	1,620	4,170	2,180
19	2,750	2,450	1,890	1,090	7,080	5,130	1,010	3,190	6,620	3,620	3,210	2,160
20	2,780	2,540	1,870	1,080	11,600	9,110	962	2,950	6,490	3,950	2,100	2,170
21	2,940	2,650	*1,950	1,070	9,860	* 21,000	923	3,060	6,320	1,860	2,090	2,100
22	3,360	2,630	*2,400	1,080	7,840	13,000	992	11,400	6,950	1,610	2,310	1,980
23	3,440	2,540	*2,430	1,060	5,680	* 5,670	2,310	10,100	9,760	1,710	2,290	1,930
24	3,350	2,490	*2,580	1,040	3,580	4,840	2,770	6,930	6,860	1,630	3,300	1,920
25	3,220	2,470	*2,150	1,050	6,070	* 21,300	2,030	5,740	5,840	1,780	2,740	1,870
26	3,080	2,480	*1,940	1,060	10,400	* 35,100	1,500	5,890	5,210	1,670	3,500	1,840
27	2,960	2,430	1,860	1,100	6,880	* 28,700	1,310	7,280	4,760	1,560	3,550	1,850
28	2,920	2,490	1,840	1,220	3,370	* 11,800	1,170	5,580	4,420	1,510	2,420	1,860
29	3,000	1,920	1,400	2,350	5,520	1,020	5,510	4,120	1,410	2,240	1,850	
30	2,970	1,930	1,850	2,000	4,840	1,150	7,340	3,880	1,460	2,200	1,830	
31	3,020	1,910	2,030	1,170	7,520	1,170	5,720	4,350				
Sum	74,330			46,440		* 193,968		289,570		71,670		* 66,220
	86,020			66,470		136,370		52,737		215,330		69,340

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Period 1924-1947			Acre-Feet
	High		Day	High	Low			Normal	Maximum	Minimum	
	High	Low	Day	High	Low			1938-1947			
Jan.	125.36	124.25	22	3,480	1	2,230	2,770	171,000	251,669	521,000	140,000
Feb.	124.84	124.20	1	3,000	27	2,400	2,650	147,000	198,833	368,690	125,000
Mar.	124.35	123.41	24	2,670	27	1,790	2,140	132,000	196,907	401,000	108,000
Apr.	126.56	122.32	13	4,680	24	1,010	1,550	92,100	189,730	340,000	92,100
May	130.96	122.26	20	14,200	12	947	4,400	270,000	413,499	833,000	98,900
June	137.28	122.44	26	35,800	14	952	* 4,470	* 385,000	491,138	1,737,000	74,500
July	126.63	122.80	1	4,440	21	917	1,700	105,000	145,770	1,240,000	105,000
Aug.	137.47	123.15	4	34,100	1	1,180	9,340	574,000	425,790	1,280,000	121,000
Sept.	132.77	125.73	15	18,900	30	3,740	7,180	427,000	988,487	5,723,800	79,400
Oct.	126.90	123.34	20	5,060	30	1,360	2,310	142,000	766,341	2,852,270	142,000
Nov.	126.64	123.34	1	4,720	13	1,510	2,310	138,000	305,480	829,260	138,000
Dec.	124.47	123.75	4	2,370	31	1,810	* 2,140	* 131,000	254,585	625,260	* 131,000
Yearly	137.47	122.26		35,800		917	3,750	2,714,100	4,898,229	9,554,530	2,643,000
											4,572,190

* Partly estimated † And other days

CONTRIBUTIONS FROM RIO SAN JUAN
Below Rio Grande City Station

DESCRIPTION: Contributions from the Rio San Juan all pass through the Marte Gómez (El Azúcar) Reservoir and reach the Rio Grande between the Roma and the Hidalgo gaging stations. Marte Gómez Dam is located on the Rio San Juan 12.4 river miles above the confluence with the Rio Grande. This confluence 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 zero of the reservoir gage is 7.64 feet above mean sea level, U.S.C. & G.S. datum. The portion of such contributions reported below reach the Rio Grande at a point about 5 river miles below the Rio Grande City gaging station. The amounts listed below were discharged from canals into the Rio Grande, but in addition and not listed below there was an undetermined amount of water from drains which entered the Rio Grande from Mexico.

RECORDS: Discharge records were furnished by the Ministry of Hydraulic Resources. 1947 records good. Records available: January 1, 1946 to December 31, 1947.

REMARKS: In 1947 from April 24 to May 12, from June 14 to 20, from July 8 to August 1, and from November 15 to 18, a total of 34,617 acre-feet flowed into the Rio Grande at this point to supplement the irrigation of American lands in the Lower Rio Grande Valley.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.9	3.5	10.6	13.1	396	11.3	2.8	172	1.1	7.8	0	11.7
2	25.1	3.5	14.8	10.9	60.4	11.3	14.8	21.9	1.8	8.1	0	11.0
3	34.6	4.2	40.3	17.0	38.5	11.3	25.1	26.5	1.8	7.4	0	7.4
4	15.2	11.0	32.8	29.3	24.0	11.3	31.1	27.9	1.8	6.0	0	7.1
5	26.5	25.4	12.0	29.0	27.9	18.4	34.6	28.6	4.9	17.6	0	7.4
6	31.8	56.5	14.8	34.3	33.9	26.8	34.3	135	5.3	31.8	0	7.8
7	32.1	43.1	14.1	32.8	34.6	92.5	38.9	22.3	5.7	26.1	0	8.1
8	31.8	60.4	9.9	30.7	37.4	66.4	119	22.2	13.1	30.4	4.2	7.8
9	24.7	27.5	8.8	19.4	38.5	68.2	438	26.1	14.1	28.6	5.7	8.8
10	19.8	25.1	11.6	55.1	250	71.0	519	24.4	7.8	29.7	8.1	8.5
11	18.7	27.5	33.2	46.3	385	101	558	20.8	14.1	16.6	9.5	8.5
12	22.6	57.9	14.8	76.3	448	31.8	586	12.4	20.1	34.3	12.4	9.2
13	22.6	38.1	15.2	67.5	44.9	39.9	579	16.2	17.3	24.0	3.5	11.0
14	23.0	19.8	27.5	34.6	44.9	199	448	16.2	8.1	23.7	3.2	11.7
15	24.4	19.8	17.0	37.1	27.9	374	456	17.7	8.1	20.1	149	12.0
16	27.1	14.8	28.2	37.8	44.5	554	452	18.7	12.7	25.4	441	10.9
17	27.1	11.0	32.8	36.7	40.6	501	463	20.1	14.5	22.2	441	9.5
18	13.4	11.0	21.2	55.0	50.2	738	470	23.0	40.6	19.4	297	11.3
19	12.7	11.0	11.3	43.8	55.4	918	473	20.8	28.6	22.2	0	9.5
20	20.1	7.4	17.7	43.4	46.3	523	470	18.4	16.3	21.2	0	9.5
21	18.7	6.0	17.7	25.8	49.5	90.1	470	19.1	19.4	22.9	0	9.5
22	23.0	13.8	17.7	26.5	39.6	96.8	466	19.1	13.8	18.7	0	8.8
23	25.8	13.1	17.7	35.7	44.2	140	315	16.2	16.2	12.7	0	12.0
24	23.7	5.7	17.0	143	48.7	136	32.9	15.9	12.4	9.2	0	10.9
25	24.0	4.9	9.9	427	48.7	132	23.3	15.2	8.5	7.1	44.5	10.2
26	24.4	3.5	8.8	544	44.5	117	144	75.2	29.7	7.1	45.6	10.2
27	26.5	4.9	5.3	551	24.7	113	281	93.2	101	6.7	45.6	8.1
28	19.1	5.7	3.9	530	18.4	45.6	332	102	5.7	7.1	64.6	7.8
29	18.7	10.6	590	17.3	42.7	342	10.6	5.0	6.7	62.9	8.1	
30	20.5	47.7	713	11.3	30.4	240	9.5	4.6	5.7	57.6	7.1	
31	22.3	10.6		10.9	240		8.8	6.0				
Sum	710.9		555.5	2,486.7		9,098.8		454.1	1,695.4			288.5
	536.1		4,364.1		5,311.8		1,076.0		532.5			

Current Year 1947

Period 1946-1947

Month	Extreme Gage Feet			Extreme Second-Feet *		Average Second-Feet	Total Acre-Feet	Acre-Feet			
	High	Low	Day	High	Low			Average	Maximum	Minimum	
Jan.			3	34.6	1	10.9	22.9	1,410	8,685	15,960	
Feb.			8	60.4	#	3.5	19.1	1,060	530	1,060	
Mar.			30	47.7	28	3.9	17.9	1,100	1,770	2,440	
Apr.			30	713	2	10.9	145	8,660	7,880	8,660	
May			12	448	31	10.9	80.2	1,930	2,465	7,100	
June			19	918	#	11.3	177	10,540	5,270	10,540	
July			12	586	1	2.8	294	18,050	9,025	18,050	
Aug.			1	172	31	8.8	34.7	2,130	8,800	15,470	
Sept.			27	101	1	1.1	15.1	901	450	901	
Oct.			12	34.3	30	5.7	17.2	1,060	530	1,060	
Nov.			#	441	0	56.5	3,360	1,680	3,360	0	
Dec.			#	12.0	#	7.1	9.3	572	572	0	
Yearly				918		0	74.3	53,773	47,371	53,773	40,970

Various days of the month * Mean daily

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: Based upon 6 meter measurements during the year. Computations by shifting channel methods. 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. Complete gage height record and discharges during peaks, 1940 through 1947.

REMARKS: On July 28, 1941 the zero of the gage was changed to mean sea level, U.S.C. & G.S. datum. At this time it was found that the elevation previously reported (79.28 feet) in these water bulletins as the elevation of the zero of the gage, was in error, the correct figure being 79.03 feet. All previously reported gage heights should be corrected accordingly. Another gage (Weather Bureau) at this bridge has a zero elevation of 79.03 feet. 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. The bottom of the river at this station is subject to considerable erosion during floods.

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

Mean Daily Gage Height in Feet — 1947

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	81.85	82.20	81.94	79.89	81.28	81.65	83.97	80.22	86.57	82.40	81.86	81.36
2	81.89	82.38	81.91	79.79	81.60	81.32	83.36	81.53	86.49	82.07	83.07	81.30
3	81.74	81.81	81.05	79.83	80.96	80.99	82.60	89.22	86.31	81.79	81.66	81.21
4	81.89	81.79	80.52	79.55	81.22	81.54	82.10	93.96	85.86	81.68	80.53	81.06
5	81.92	"81.70	80.64	"79.35	81.22	80.25	81.79	95.17	85.65	81.73	80.12	81.21
6	81.78	81.61	80.47	80.32	80.73	79.96	81.68	94.91	86.20	81.38	79.99	81.46
7	82.04	81.56	80.42	"79.35	79.91	79.91	81.37	93.47	86.80	81.35	80.61	81.62
8	82.05	81.45	80.62	"79.35	79.25	80.09	80.98	91.26	86.66	81.18	80.67	81.39
9	82.13	82.00	81.23	"79.35	78.78	79.07	80.60	89.04	85.99	80.93	80.98	81.07
10	82.07	81.89	80.82	80.07	78.87	78.77	80.48	86.87	85.09	80.84	80.34	81.03
11	82.07	81.52	80.50	* 79.01	79.41	78.23	80.73	85.70	84.32	80.98	79.73	81.30
12	82.15	81.58	80.65	* 79.50	78.82	77.86	81.14	85.16	83.78	81.39	79.45	81.58
13	82.19	80.85	80.68	80.66	79.59	79.32	80.96	84.78	83.53	80.61	79.37	81.72
14	81.92	80.74	80.69	82.38	82.81	79.95	80.50	84.45	81.68	80.57	79.43	81.83
15	82.20	80.91	80.67	83.04	85.77	79.88	80.16	84.22	88.21	80.50	79.82	81.90
16	82.28	81.52	81.32	82.37	85.82	79.68	79.98	84.04	89.21	80.19	80.76	81.86
17	82.27	81.22	80.44	80.61	84.32	81.02	79.88	84.02	87.29	80.17	80.94	81.80
18	82.44	80.85	80.12	79.83	83.65	80.65	79.92	84.69	86.17	80.45	80.37	81.52
19	82.52	80.74	80.19	80.05	83.74	80.19	80.63	84.27	85.39	80.91	82.19	81.56
20	82.38	80.57	79.97	79.85	86.14	83.37	80.65	83.81	85.02	82.00	82.34	81.55
21	82.08	80.75	79.87	78.68	87.84	87.98	79.12	83.51	85.28	83.02	81.04	81.55
22	82.31	81.28	79.59	78.28	87.00	90.41	78.55	83.50	84.77	81.57	80.72	81.48
23	82.58	81.86	79.00	78.18	86.28	87.13	78.71	87.46	86.30	80.46	81.26	81.35
24	82.81	81.54	79.13	78.17	85.29	84.90	79.34	86.68	86.78	80.35	81.44	81.19
25	82.82	81.50	79.21	78.66	84.18	84.89	81.56	85.47	85.23	80.47	81.65	81.30
26	82.87	81.88	79.11	80.01	86.40	92.45	82.11	84.88	84.45	80.83	82.21	81.35
27	82.47	81.97	79.96	80.55	87.39	94.19	81.38	85.41	83.89	80.11	82.63	81.31
28	82.10	82.02	79.91	80.67	85.78	92.20	79.51	85.81	83.73	79.67	82.90	81.28
29	81.95	79.79	80.80	83.83	87.21	79.10	85.20	83.31	79.43	82.24	81.26	
30	81.91	79.14	81.02	82.67	84.81	79.04	85.12	82.85	79.21	81.82	81.00	
31	81.97	79.78		81.94		79.11	86.22		79.22			

Sum

Month	Current Year 1947			Period				
	Extreme Gage Feet		Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet	
	High	Low	Day	Day			Normal	Maximum
June	94.33		27	29,200				
Aug.	95.33		5	33,600				
April		77.99			23			
May		78.47			10			
June		77.79			12			
July		78.50			22			
Yearly								

* Partly estimated # Estimated

RIO GRANDE AT LAS PALMAS, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with cable car, located 1,640 feet below the Reta-mal 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 upon 162 meter measurements during the year, 161 by the Mexican and 1 by the United States Section of this Commission. Computations by shifting channel methods. 1947 records good. Records available: gage heights from January 13 to October 31, 1945 and daily discharges from November 1, 1945 to December 31, 1947.

REMARKS: This station was constructed by the National Irrigation Commission of Mexico and is operated by the Mexican Section of the International Boundary and Water Commission. This station replaces the station at Buenos Aires which was destroyed by the flood of September 1, 1944. Gage readings began January 13, 1945. The recorder was installed October 4, 1945, and measurements began November 1, 1945.

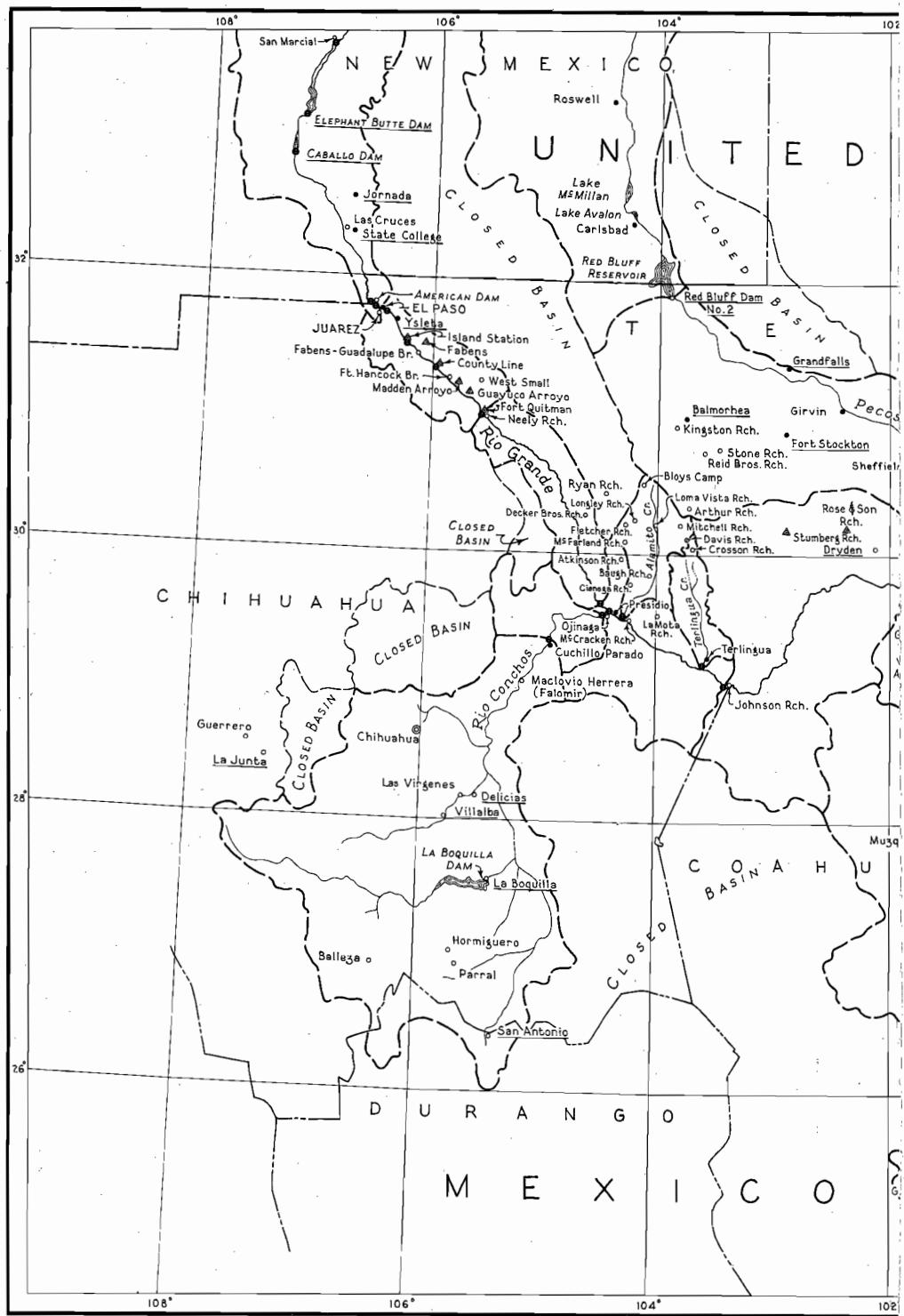
CORRECTION: The extreme high second-feet for May 1946 and for the year 1946 as published in Water Bulletin No. 16 should be changed to 30,510 and 33,760 respectively.

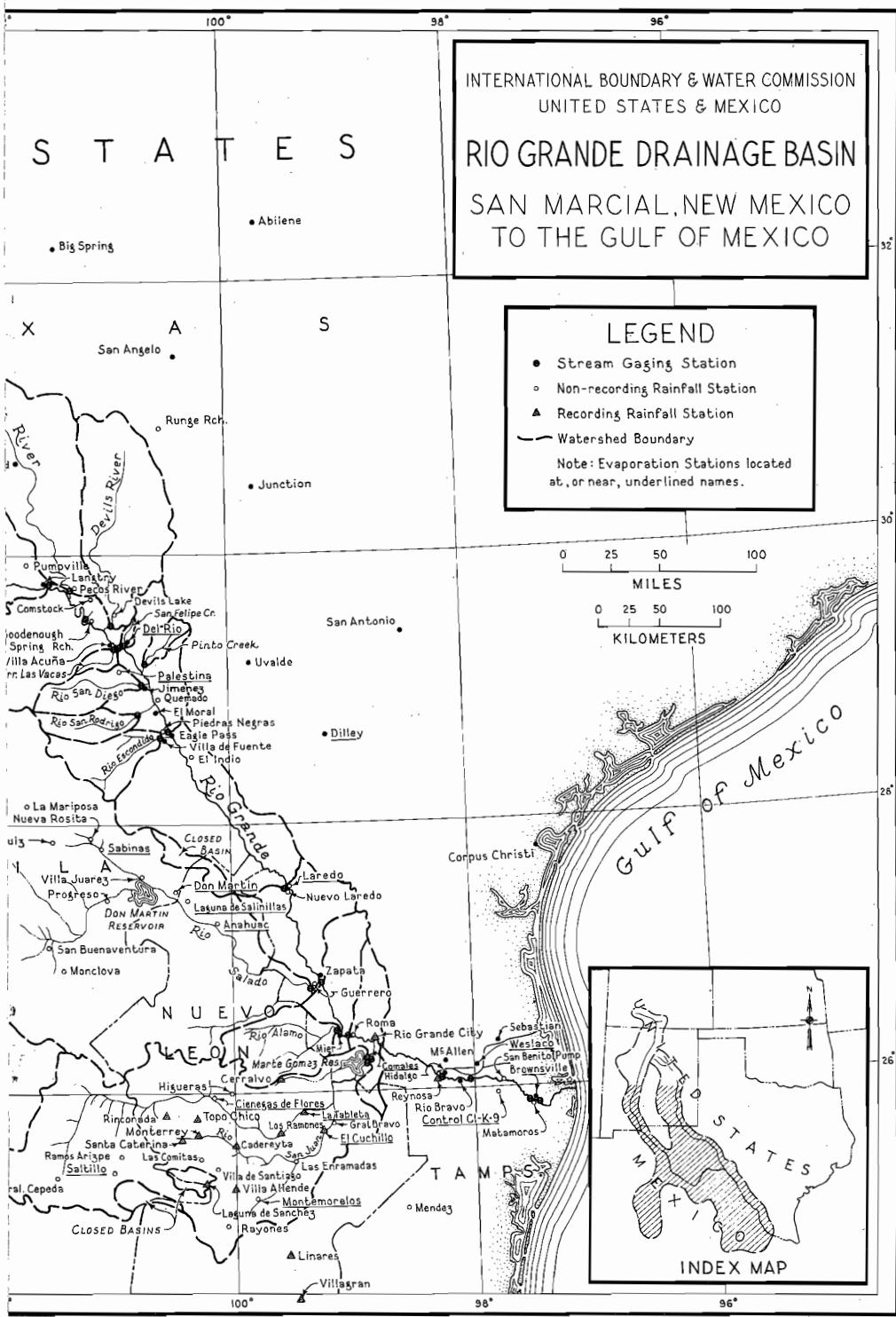
Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,870	2,040	2,000	911	1,530	1,900	3,080	484	6,070	2,380	795	1,880
2	1,980	2,200	1,980	840	1,740	1,780	2,560	1,020	6,070	2,150	2,390	1,720
3	1,930	2,090	1,760	840	1,720	1,480	2,010	8,160	5,900	2,010	2,290	1,680
4	1,870	1,870	1,290	819	1,440	1,200	1,610	23,170	5,470	1,820	1,550	1,660
5	1,920	1,890	1,240	710	1,700	985	26,590	5,300	1,840	1,140	1,720	
6	1,920	1,790	1,200	883	1,580	911	1,310	25,320	5,300	1,720	996	1,870
7	1,920	1,670	1,120	869	1,080	731	1,270	22,390	6,000	1,570	1,140	1,990
8	2,050	1,580	1,140	558	720	738	1,020	17,450	6,430	1,540	1,260	1,930
9	2,090	1,950	1,210	597	523	611	862	11,720	5,690	1,410	1,320	1,660
10	2,160	2,070	1,440	777	445	332	763	7,520	4,840	1,500	1,340	1,570
11	2,130	1,890	1,310	759	516	237	770	5,400	3,990	1,270	972	1,680
12	2,140	1,730	1,180	512	572	96.4	989	4,520	3,600	1,510	759	1,900
13	2,200	1,410	1,220	837	463	153	1,060	3,960	3,180	1,420	675	2,050
14	2,120	1,190	1,350	1,760	1,530	660	911	3,640	3,220	1,100	625	2,150
15	2,040	1,180	1,330	2,540	4,130	773	717	3,390	8,160	1,140	724	2,170
16	2,220	1,420	1,360	2,560	5,720	565	579	3,280	12,710	1,040	1,120	2,150
17	2,210	1,540	1,490	1,730	4,700	1,030	514	3,200	9,180	953	1,480	2,070
18	2,300	1,340	1,050	954	3,670	1,270	523	3,530	6,670	943	1,290	1,980
19	2,390	1,280	1,010	840	3,360	1,030	720	3,710	5,510	1,140	1,550	1,820
20	2,320	1,150	972	922	4,770	1,740	985	3,200	4,590	1,410	2,500	1,900
21	2,090	1,090	894	724	8,830	7,350	713	2,970	4,560	2,530	1,920	1,950
22	2,070	1,260	936	434	8,020	15,040	251	2,760	4,340	2,240	1,290	1,950
23	2,250	1,620	1,140	308	6,290	9,680	150	6,750	5,230	1,400	1,490	1,910
24	2,510	1,800	1,410	227	5,540	4,940	235	7,490	8,330	1,010	1,800	1,820
25	2,620	1,640	1,300	232	4,590	3,740	717	5,260	5,580	1,040	1,850	1,840
26	2,700	1,780	1,360	671	5,510	18,680	1,700	4,380	4,100	1,140	2,190	1,910
27	2,610	1,950	1,180	1,170	8,330	25,630	1,590	4,450	3,180	1,170	2,450	1,830
28	2,250	2,010	1,010	1,320	6,290	19,560	886	5,370	3,260	855	2,860	1,730
29	2,020	989	1,350	4,200	8,650	406	4,840	3,170	756	2,270	2,550	1,660
30	1,980	1,100	1,450	2,860	4,240	289	4,270	5,160	600	2,150	1,570	1,630
31	1,950	1,170			2,200	338			477			
Sum			46,430	29,114	104,569	133,732.4		235,354		42,884	46,466	57,350
66,810			39,141					30,948		162,700		

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet				
	High	Low	Day	High	Low			Average	Maximum	Minimum		
Jan.	67.06	66.17	26	2,700	31	1,920	2,160	132,500	172,100	132,500		
Feb.	66.60	64.86	3	2,240	21	1,050	1,660	92,090	107,545	92,090		
Mar.	66.27	64.21	1	2,020	21	858	1,260	77,640	77,640	63,210		
Apr.	66.86	62.66	16	2,660	25	184	970	57,750	87,025	57,750		
May	71.49	63.12	21	9,290	13	420	3,370	207,400	298,400	389,400		
June	77.43	62.89	27	24,370	12	69.6	4,460	265,300	348,200	431,100		
July	68.96	64.30	1	3,460	23	138	998	61,390	104,145	146,900		
Aug.	78.58	64.70	6	27,300	1	396	7,590	466,800	273,420	466,800		
Sept.	73.65	67.19	16	13,880	30	2,590	5,420	322,700	323,150	322,700		
Oct.	67.26	64.04	21	2,730	31	477	1,580	85,060	305,230	525,400		
Nov.	67.29	64.04	28	2,920	14	558	1,550	92,170	125,723	85,060		
Dec.	66.40	65.39	15	2,190	30	1,450	1,850	113,800	122,633	103,000		
Yearly	78.58	62.66		27,300		69.6	2,730	1,974,600	2,318,211	2,586,080		
Period 1945-1947												

Period 1945-1947





RIO GRANDE FLOODWAY DISCHARGES IN THE LOWER RIO GRANDE VALLEY

In The United States

There are three floodways on the United States side of the Lower Rio Grande Valley which divert excess floodwaters from the Rio Grande to the Gulf of Mexico. There was no flood flow through any of these floodways in 1947.

North Floodway Near Sebastian, Texas

The channel of the North Floodway in the vicinity of Sebastian serves as a drainage channel as well as a floodway. During 1947 an average of two meter measurements per month was made of the drainage flow at this point. From these measurements and rainfall records, the following table of estimated discharge was prepared.

Mean Daily Second-Feet—1947				Acre-Feet			
Month	Average	Maximum	Minimum	Total 1947	# Period 1940-1947		
					Average	Maximum	Minimum
January	52.6	80.0	49.1	3,240	3,210	7,450	1,400
February	66.6	78.5	54.4	3,700	2,916	6,010	1,610
March	68.3	71.9	60.3	4,200	3,424	5,380	1,880
April	61.4	210	29.4	3,650	3,117	5,900	1,710
May	69.2	531	26.4	4,260	6,279	24,200	2,290
June	42.5	73.2	20.7	2,520	4,389	9,090	942
July	14.1	50.5	4.9	865	2,478	7,170	865
Aug.	120	430	49.4	7,400	2,476	7,400	605
Sept.	49.2	53.3	44.5	2,930	20,771	125,700	1,400
Oct.	58.2	64.1	47.0	3,580	3,168	7,180	136
Nov.	59.9	180	46.2	3,360	2,356	3,750	861
Dec.	63.3	69.2	57.4	3,890	3,164	4,480	1,830
Yearly	60.4	531	4.9	43,795	57,748	158,550	28,412

Record began October, 1940 φ Period 1941-1947

In Mexico

There are several floodways on the Mexican side of the Rio Grande, which also divert excess floodwaters from the Rio Grande and convey them to the Gulf of Mexico. There was no flood flow through any of these floodways in 1947.

RIO GRANDE AT MATAMOROS, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and winch. The water-stage recorder is attached to the central pier of the railroad bridge over the Rio Grande between Matamoros, Tamaulipas, and Brownsville, Texas, 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 0.3 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 upon 177 meter measurements during the year, 168 by the Mexican and 9 by the United States Section of this Commission. The river bottom shifts greatly at this station. Computations by shifting channel methods. 1947 records good. Records available: 1901 to 1913; 1923 to December 1947.

REMARKS: In May 1924 a recorder was established 0.6 mile upstream from the bridge. In September 1925 the recorder was moved to its present location. On October 3, 1950, the zero of the gage was lowered 5 feet. 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 in both countries, which divert from the Rio Grande within 117.4 miles above this station.

EXTREME FLOWS: The greatest flow recorded here was on June 22, 1903 when a mean daily flow of 36,200 second-feet occurred with a gage height of 13.2 feet. The greatest flow since 1923 was on September 16, 1942 when 32,300 second-feet passed this station with a gage height of 22.51 feet. In 1930 the river at this station was dry for a few days in March and April. July 21, 1947 the minimum flow was 1.4 second-feet with a stage of -.07 foot.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,030	848	1,540	90.8	406	2,620	3,849	43.1	4,697	1,487	29.3	2,013
2	1,280	756	1,560	101	554	2,140	2,836	68.5	5,015	1,170	38.5	1,413
3	1,600	939	1,430	65.7	805	1,600	1,858	194	4,944	975	108	897
4	1,700	841	1,200	57.9	943	1,450	964	11,940	4,944	780	696	812
5	1,830	533	858	43.4	826	1,240	22,000	4,873	780	597	752	
6	1,920	406	449	42.0	491	901	243	23,590	4,697	682	250	777
7	1,770	449	319	40.6	392	717	111	23,200	5,015	745	86.2	1,081
8	1,450	378	279	62.5	246	653	135	20,800	5,686	551	58.3	1,437
9	1,380	360	345	62.2	76.6	558	111	14,600	5,509	388	64.6	1,324
10	1,650	357	717	25.8	52.5	223	121	9,640	4,026	328	207	932
11	1,970	569	664	8.5	27.9	70.3	76.3	6,500	4,202	334	260	752
12	1,950	703	466	15.9	19.4	46.6	39.2	4,870	3,708	236	179	1,059
13	1,900	565	251	63.6	10.6	29.0	20.8	4,200	3,111	296	73.5	1,540
14	1,850	554	179	44.5	4.9	21.5	7.8	3,820	2,855	561	39.2	1,967
15	1,760	456	239	140	8.1	13.1	7.4	3,520	2,882	494	19.1	2,048
16	1,480	463	544	999	572	13.1	43.8	3,460	7,875	303	12.7	2,080
17	1,490	526	763	1,469	2,810	47.7	23.0	3,360	10,100	269	10.6	1,967
18	1,630	533	586	1,356	2,950	32.5	6.4	3,480	6,816	169	14.1	1,798
19	1,970	590	427	724	2,420	25.4	3.5	3,530	4,909	154	90.8	1,769
20	2,170	555	266	554	2,360	80.9	2.8	3,670	4,132	144	73.1	1,801
21	2,050	392	180	505	3,530	56.5	1.8	3,450	3,673	166	164	1,858
22	1,780	231	167	243	6,750	4,840	2.5	3,080	3,602	470	717	1,808
23	1,510	231	224	87.9	6,710	11,090	41.7	2,590	3,316	936	487	1,511
24	1,490	544	354	56.9	6,000	6,000	40.6	5,160	5,474	682	347	1,303
25	1,650	742	360	24.4	5,790	3,250	25.1	6,040	6,533	316	597	1,540
26	1,820	865	231	46.6	5,010	3,670	26.5	5,120	4,379	159	865	1,561
27	1,920	1,260	145	270	5,190	16,350	15.2	4,310	3,997	112	1,293	1,508
28	1,780	1,530	116	378	6,960	19,850	85.5	3,990	2,451	240	1,727	1,519
29	1,500	96.4	332	6,430	14,550	219	4,630	21,115	158	2,112	1,741	
30	1,210	78.0	445	4,840	6,140	84.4	4,380	1,854	67.1	2,306	1,600	
31	999	69.2	3,530			42.0	4,240		37.8		1,091	
Sum	17,176	8,355.2	76,717.8	98,278.6		213,565.6			14,189.9		45,259	
	51,469	15,102.6	11,567.3	137,088		13,522.0						

Month	Current Year 1947			Period 1924-1947			Acre-Feet Normal 1938-1947				
	Extreme Gage Feet		Day	Extreme Second-Feet		Total Acre-Feet	Acre-Feet				
	High	Low		High	Low		Normal	Maximum	Minimum		
Jan.	4.17	2.17	20	2,170	31	932	1,660	102,100	213,177	190,800	92,240
Feb.	3.22	59	28	1,550	23	204	613	34,070	146,539	328,300	28,470
Mar.	5.28	- .46	2	1,560	31	69.2	487	29,960	111,947	240,800	18,210
Apr.	3.18	- .98	17	1,840	12	6.4	279	16,370	109,872	317,800	34,877
May	9.84	-1.18	28	7,170	14	3.2	2,470	152,200	279,776	721,100	34,630
June	16.24	- .56	28	20,270	#	13.1	3,280	194,900	373,264	1,180,500	2,580
July	7.38	- .07	1	4,870	21	1.4	373	22,940	309,468	756,600	22,940
Aug.	18.44	- .33	6	24,370	1	25.4	6,890	423,600	290,028	833,700	318,597
Sept.	11.42	-3.54	17	11,050	30	1,660	4,570	271,900	611,382	1,363,200	24,740
Oct.	3.54	- .66	1	1,700	51	29.3	458	28,150	583,290	1,408,500	28,150
Nov.	4.00	- .89	30	2,340	17	8.5	451	26,820	265,935	827,500	26,820
Dec.	3.94	1.67	16	2,110	11	735	1,460	89,770	206,628	594,200	61,560
Yearly	18.44	-1.18		24,370		1.4	1,924	1,392,980	3,501,306	6,579,500	1,392,980
											3,122,303

Various days of the month

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 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 upon 79 meter measurements during the year, 62 by the United States and 17 by the Mexican Section of this Commission. Computations by shifting channel methods. 1947 records good. Records available: January 1934 to December 1947.

REMARKS: Reservoirs, diversions, and drainage returns, modify the river 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 in both countries, which divert from the Rio Grande within 124.6 miles above this station.

EXTREME FLOWS: On September 14, 1942 a peak discharge of 31,000 second-feet was reached with a gage height of 33.24 feet. The river was dry at this station a few days in 1930, March 25-28, 1935, June 16-19, 1938, several days in 1940, 1943, 1944, 1945, 1946, and 1947.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	905	520	1,380	44.5	289	2,700	3,020	11.5	4,370	1,350	9.7	1,670
2	1,060	440	1,480	126	337	2,060	1,780	22.8	4,670	1,040	8.8	1,240
3	1,240	591	1,260	24.8	555	1,620	1,270	116	4,570	748	32.6	816
4	1,420	557	1,000	16.3	719	1,280	704	6,870	4,550	617	502	727
5	1,540	390	687	15.7	707	1,120	377	18,400	4,490	655	476	679
6	1,670	288	331	15.1	401	813	193	21,400	4,340	599	237	715
7	1,590	322	232	10.8	266	591	67.8	22,200	4,590	640	59.0	973
8	1,250	314	250	12.5	182	526	66.7	20,400	5,130	478	32.3	1,290
9	1,110	226	258	18.8	46.4	469	90.7	15,000	5,300	302	22.8	1,270
10	1,300	206	444	10.5	27.1	201	68.4	9,790	4,750	230	83.4	964
11	1,770	366	458	17.0	10.1	39.1	16.2	6,420	4,070	169	152	729
12	1,860	440	401	15.1	8.8	11.0	0	4,640	3,410	144	129	901
13	1,840	404	236	29.2	24.4	2.5	0	3,850	2,950	126	51.9	1,410
14	1,810	133	170	16.3	21.7	4.4	0	3,570	2,690	305	15.6	1,810
15	1,680	388	206	97.5	23.7	10.3	0	3,380	2,670	379	1.0	2,020
16	1,430	300	400	729	180	8.7	0	3,210	7,050	222	5.0	2,100
17	1,350	360	588	1,250	2,120	12.3	0	2,990	10,100	153	4.4	1,980
18	1,510	311	511	1,250	2,680	6.8	0	3,040	7,560	92.0	5.8	1,730
19	1,760	384	419	693	2,440	10.4	0	3,010	5,640	104	8.3	1,700
20	1,930	314	263	316	2,300	23.9	0	3,080	4,420	117	8.0	1,730
21	1,820	240	173	305	2,900	5.8	0	2,940	3,670	115	28.1	1,730
22	1,570	230	169	242	6,180	3,080	0	2,570	3,410	272	4.6	1,710
23	1,270	199	180	86.0	6,680	9,920	0	2,240	3,160	690	4.6	1,460
24	1,200	352	219	20.0	6,030	6,510	8.2	4,200	4,110	581	337	1,240
25	1,300	554	229	5.0	5,550	3,060	0	6,020	6,290	303	476	1,410
26	1,530	737	170	11.4	4,590	3,010	0	4,970	4,760	135	791	1,570
27	1,620	1,080	155	5.8	4,400	13,100	0	3,920	3,230	62.2	1,200	1,520
28	1,560	1,350	124	70.9	6,120	18,500	1.5	3,610	2,450	125	1,600	1,400
29	1,290	125	224	5,750	14,800	111	4,080	2,060	141	1,790	1,510	1,510
30	950	29.1	310	4,590	6,250	48.9	4,230	1,770	45.8	1,900	1,480	1,480
31	663	13.8	3,680	0	0	0	0	4,030	11.9	11.9	1,290	1,290
Sum	12,296	5,988.2	89,745.2	194,210.3	10,951.9	42,774						
	44,798	12,520.9	69,808.2	7,823.4	132,230	10,838.7						

Month	Current Year 1947			Period 1934-1947			Normal 1938-1947		
	Extreme Gage Feet		High	Extreme Second-Feet		Average Second- Feet	Acre-Feet		
	High	Low		Day	Day		Normal	Maximum	Minimum
Jan.	18.93	12.53	20	1,960	31	598	1,450	88,900	181,436
Feb.	13.85	10.76	28	1,400	23	179	439	24,400	124,393
Mar.	13.97	9.56	2	1,510	31	9.7	404	24,800	95,721
Apr.	13.76	9.36	17	1,380	25	0	200	11,900	90,057
May	21.00	9.45	22	6,940	111	0	2,250	138,000	269,736
June	27.65	9.29	28	19,000	112	0	2,990	178,000	348,599
July	18.87	10.90	1	4,080	111	0	252	15,500	259,821
Aug.	29.65	10.90	7	22,400	1	0	6,260	385,000	679,000
Sept.	22.79	14.35	17	10,700	30	1,570	4,410	262,000	570,950
Oct.	14.34	9.65	1	1,570	31	0	353	21,700	1,427,000
Nov.	14.64	9.65	30	1,920	1	0	361	21,500	192,636
Dec.	14.59	12.08	17	2,010	5	632	1,380	84,800	157,843
Yearly	29.65	9.29		22,400	0	0	1,740	1,256,500	3,093,527
								6,526,000	1,256,500
									3,006,528

* 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 María, 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 Reservoir from the Compañía Agrícola y de Fuerza Eléctrica del Río Conchos, S.A.; Don Martín, Centenario, and San Miguel from the Banco Nacional de Crédito Agrícola, S.A.; Culebrón, Villa Cárdenas, and Palito Blanco from the Ministry of Hydraulic Resources of Mexico; Marte Gómez Reservoir (formerly called El Azúcar Reservoir) from the Lower San Juan Irrigation District of Tamaulipas, Mexico.

In The United States

Month	Rio Grande (Capacity 51.1)		Continental (Capacity 26.7)		Santa María (Capacity 43.6)		Terrace (Capacity 17.7)		Mountain Home (Capacity 20.1)		Sanchez (Capacity 103.2)		Costilla (Capacity 15.7)		El Vado (Capacity 200.3)		Bluewater (Capacity 43.5)	
	1947	#Normal 1927-1947	1947	#Normal 1928-1947	1947	#Normal 1928-1947	1947	#Normal 1929-1947	1947	#Normal 1929-1947	1947	#Normal 1929-1947	1947	#Normal 1929-1947	1947	Normal 1935-1947	1947	#Normal 1927-1947
Jan.	4.0	13.6	1.3	5.2	3.5	7.3	2.6	2.6	1.6	4.4	5.8	12.6	2.4	3.7	24.5	55.6	1947	1927-1947
Feb.	4.9	14.9	1.3	5.2	4.4	8.0	3.2	3.0	2.0	4.8	6.1	12.7	2.7	4.0	30.4	57.0	1947	1927-1947
Mar.	6.9	16.3	1.3	5.2	5.5	9.5	3.6	3.5	2.4	5.2	6.7	13.4	3.3	4.6	42.4	62.4	1947	1927-1947
Apr.	6.9	15.9	1.3	5.3	5.5	11.4	2.4	4.0	3.0	5.8	7.7	15.3	3.5	5.8	61.0	119.2	1947	1927-1947
May	11.1	24.3	7.9	7.5	7.0	16.0	2.9	7.2	10.7	8.4	19.4	21.1	9.4	8.5	179.3	174.6	1947	1927-1947
June	12.4	26.0	7.9	7.8	7.9	18.6	3.3	8.8	12.9	8.5	17.7	19.4	8.7	7.5	171.3	158.8	1947	1927-1947
July	12.0	18.0	7.9	6.1	1.9	12.9	3.2	5.7	6.2	6.2	12.9	14.5	1.1	1.1	133.1	125.6	1947	1927-1947
Aug.	0	18.0	7.9	4.1	4.7	4.9	1.9	3.0	6.8	3.8	7.6	10.9	4.6	2.8	110.2	95.6	1947	1927-1947
Sept.	3.7	6.0	1.6	4.9	1.5	4.6	4.0	2.5	6.4	3.4	8.0	11.5	4.4	2.1	117.1	74.0	1947	1927-1947
Oct.	10.7	7.6	1.6	4.5	2.8	5.1	4.6	2.7	6.8	3.5	7.8	12.3	4.4	2.7	106.7	66.7	1947	1927-1947
Nov.	15.0	11.1	1.8	4.6	4.0	6.0	5.1	2.2	7.2	4.0	8.3	12.2	5.1	3.1	36.6	36.2	1947	1927-1947
Dec.	18.5	12.7	2.0	4.9	4.3	6.6	5.4	2.6	7.2	4.3	6.9	12.1	5.5	3.4	5.6	52.8	1947	1927-1947
Avg.	7.8	14.2	3.1	5.5	4.0	9.1	3.4	4.0	6.2	5.2	9.6	14.0	5.0	4.4	86.5	92.4	1947	1927-1947
Max.	18.5	51.8	7.9	22.2	7.9	42.1	5.4	17.7	12.9	16.4	19.6	62.4	9.4	15.1	179.3	202.3	1947	1927-1947
Min.	0	0	1.2	0	1.8	0	1.9	0	1.6	0	5.8	1.6	2.4	0	5.6	2.3	1947	1927-1947

Month	Elephant Butte (Capacity 2,197.6)		Caballo (Capacity 346.0)		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 3,532.7)		Estimated Normal	
	1947	Normal 1915-1947	1947	Normal 1928-1947	1947	Normal 1937-1947	1947	Normal 1937-1947	1947	Normal 1930-1947	1947	Normal 1939-1947	1947	Average 1939-1947	1947	
Jan.	557.3	1,045.7	295.0	215.0	44.7	66.0	31.8	31.8	75.8	151.7	17.9	15.1	1,008.8	1,634.3	1947	1927-1947
Feb.	537.6	1,046.4	285.7	210.6	49.1	70.2	7.3	32.1	82.7	155.5	17.2	14.3	1,037.6	1,687.7	1947	1927-1947
Mar.	507.4	1,034.2	266.5	185.1	37.3	58.2	4.8	30.1	79.6	152.5	14.6	13.4	982.4	1,593.6	1947	1927-1947
Apr.	446.4	1,040.8	208.1	147.2	23.3	50.5	4.7	21.2	49.4	128.9	13.0	14.0	856.3	1,486.2	1947	1927-1947
May	461.3	1,183.7	188.6	129.9	36.5	66.0	6.3	25.0	45.5	147.3	17.1	14.2	1,003.4	1,833.7	1947	1927-1947
June	405.7	1,144.3	144.4	101.8	34.5	55.7	1.1	23.2	38.8	162.1	10.5	14.9	876.2	1,489.3	1947	1927-1947
July	381.1	1,169.8	70.6	71.0	2.8	55.6	1.1	15.1	31.4	14.1	14.5	14.5	608.2	1,489.1	1947	1927-1947
Aug.	319.2	1,079.7	47.1	47.0	5.7	37.4	1.1	12.0	12.5	14.0	13.9	13.9	529.5	1,484.2	1947	1927-1947
Sept.	316.9	1,049.7	15.0	37.8	8.6	53.5	.4	19.7	12.0	121.5	15.4	15.3	513.3	1,406.8	1947	1927-1947
Oct.	309.9	1,041.5	28.8	73.5	9.3	58.0	.3	22.7	17.0	125.0	9.6	15.1	580.3	1,404.0	1947	1927-1947
Nov.	366.1	1,041.9	40.3	114.2	13.9	54.3	1.7	24.5	21.1	129.7	9.4	14.2	559.9	1,478.2	1947	1927-1947
Dec.	435.5	1,046.3	155.1	205.9	58.4	54.8	4.5	28.6	27.5	135.3	15.9	16.2	610.9	1,539.5	1947	1927-1947
Avg.	417.5	1,089.5	132.6	123.8	28.2	56.6	3.7	24.6	41.6	140.1	13.2	14.6	798.6	1,596.0	1947	1927-1947
Max.	4,576.1	4,302.8	4,306.9	4,346.6	49.1	156.3	12.4	85.5	82.7	327.5	17.9	22.0	2,107.6	4,576.1	1947	1927-1947
Min.	0	298.6	3.3	3.8	4	.1	2.8	1.7	.3	0	12.0	11.0	4.2	513.3	1947	1927-1947

Month	Boquilla (Capacity 2,116.0)		Centenario and San Miguel (Capacity 19.9)		Don Martín (Capacity 1,123.0)		Marte Gómez (Capacity 871.5)		Culebrón (Capacity 104.2)		Palito Blanco (Capacity 124.0)		Total in Mexican Reservoirs (Capacity 4,358.6)		Estimated Normal	
	1947	Normal 1914-1947	1947	Normal 1934-1947	1947	Normal 1930-1947	1947	Average 1943-1947	1947	Average 1939-1947	1947	Average 1942-1947	1947	Total		
Jan.	1,167.5	1,595.4	18.0	12.8	640.9	415.6	591.8	355.2	69.6	60.4	91.9	41.6	2,579.7	2,422.0	1947	1927-1947
Feb.	1,115.1	1,505.2	18.1	12.6	632.8	402.6	555.3	335.8	43.1	51.9	67.8	35.9	2,452.2	2,344.0	1947	1927-1947
Mar.	1,051.6	1,456.3	12.5	9.5	583.6	379.6	521.3	254.8	23.5	38.8	57.8	28.6	2,250.3	2,157.2	1947	1927-1947
Apr.	987.5	1,594.8	8.0	7.8	572.9	366.7	523.7	264.1	19.2	32.1	56.6	16.1	2,127.9	2,082.0	1947	1927-1947
May	887.1	1,331.1	11.6	9.5	554.7	355.3	506.7	260.0	32.7	40.7	55.9	12.4	2,092.5	2,036.0	1947	1927-1947
June	829.3	1,279.0	10.0	8.5	526.2	332.1	507.3	284.7	29.5	32.9	52.8	10.2	1,971.7	1,917.7	1947	1927-1947
July	760.3	1,279.7	10.0	8.1	469.5	346.4	459.7	266.1	22.5	46.7	45.0	21.2	1,747.1	1,748.4	1947	1927-1947
Aug.	1,182.7	1,456.6	15.8	9.1	589.0	350.9	893.4	365.2	79.8	52.3	59.5	25.6	2,818.2	2,299.7	1947	1927-1947
Sept.	1,413.8	1,620.5	17.3	11.9	602.9	409.4	861.0	395.1	76.0	60.8	61.5	29.4	3,032.5	2,527.1	1947	1927-1947
Oct.	1,370.7	1,613.8	19.3	13.0	600.4	433.8	850.4	449.2	52.5	67.8	45.0	46.9	2,938.7	2,664.5	1947	1927-1947
Nov.	1,290.4	1,575.3	19.0	11.7	589.0	446.9	826.1	448.3	61.3	60.3	40.5	47.6	2,826.5	2,590.1	1947	1927-1947
Dec.	1,259.5	1,595.8	15.7	12.2	583.6	449.4	821.2	449.8	61.2	60.9	48.2	47.2	2,789.4	2,588.1	1947	1927-1947
Avg.	1,106.1	1,464.1	14.8	10.6	579.1	392.5	661.2	346.9	51.5	50.5	47.8	31.0	2,460.1	2,297.7	1947	1927-1947
Max.	1,413.8	2,292.5	19.3	20.6	640.9	1,163.4	893.4	891.1	79.8	108.1	91.9	104.6	3,032.5	2,664.5	1947	1927-1947
Min.	760.3	37.6	8.0	.6	469.6	.7	459.7	2.1	19.2	13.1	19.9	.6	1,747.1	1,748.4	1947	1927-1947

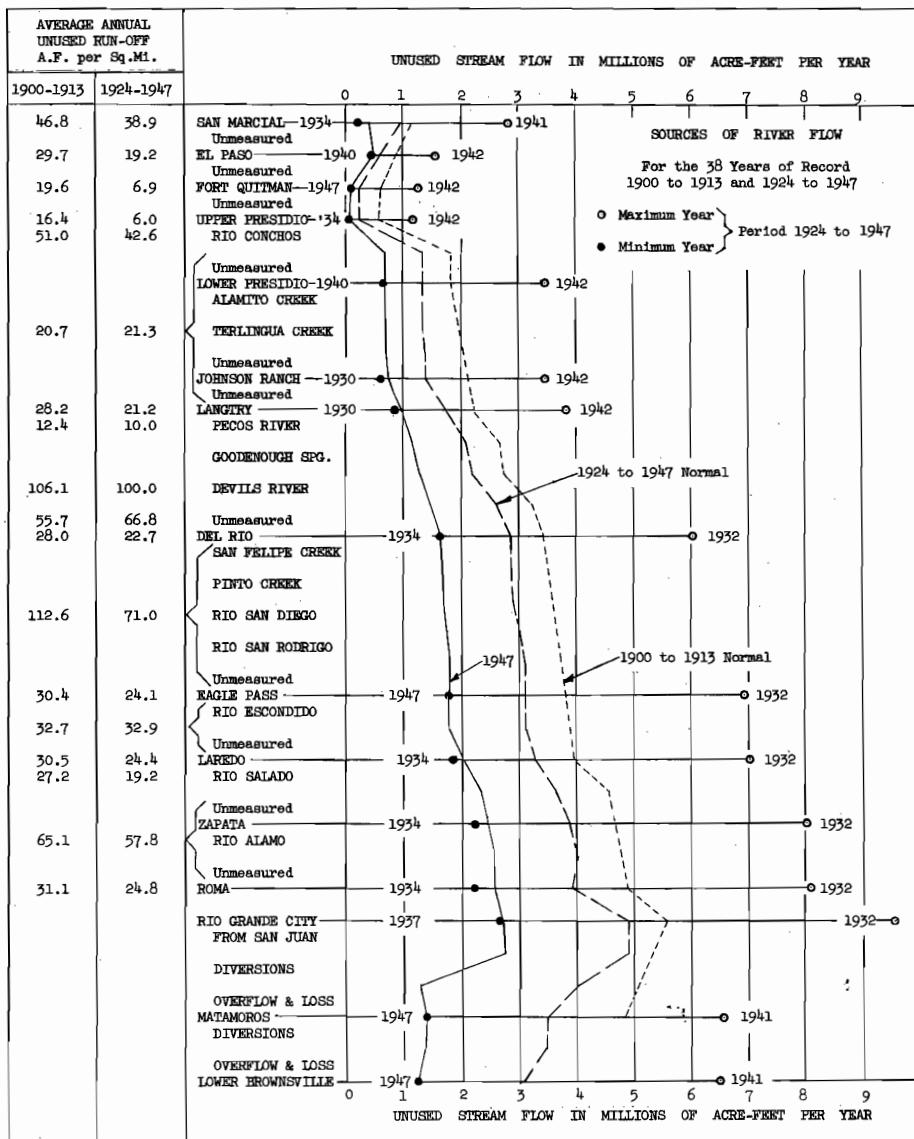
* Estimated # Some months missing ## These figures do not include Bluewater Reservoir. e Includes Villa Cárdenas * Storage in Marte Gómez began March 10, 1943. d Daily extreme

SOURCES OF RIVER FLOW

The table and graph on this page present data on the yield of the incremental drainage areas within the watershed. It is important to note that the tabular information shows unused run-off in acre-feet per square mile and the graph shows unused stream flow in acre-feet per year. In addition to the difference in units, other differences are involved and the two illustrations are not of the same elements of yield.

The graph presents the total flow actually passing certain points based on the stream flow measurements which have been accepted in this series of bulletins. The tabular information is an adjusted figure of net unconsumed yield based on stream flow measurements as modified by upstream reservoir storage. As nearly as possible the difference between the two columns of tabular information reflects changes in consumption and changes in gross yield.

No figure is included in the table for Goodenough Spring because practically no surface drainage area is involved and the water comes from underground sources. The average annual run-off from this source during the period 1900-1913 is estimated at 115,000 acre-feet and the average annual run-off during the period 1924-1947 was 105,800 acre-feet.



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

DESCRIPTION: This gaging station is an open channel rating station in a concrete lined canal with water-stage recorder located 396 feet below the head gates at the American Dam near El Paso, Texas. The center of the American Dam is about .05 mile upstream from the point where the Western Land Boundary joins the River Boundary between the United States and Mexico. Measurements are made at the downstream end of the first covered section of this canal. Zero of the gage is 3,712.09 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 44 meter measurements during the year and a stable rating curve. 1947 records good. Records available: June 2, 1938 to December 31, 1947.

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. This canal was constructed by the United States Section in connection with the American Dam. 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. At times, two small diversions are made from this canal.

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

Average Flow in Second-Feet

<u>Daily:</u>	Max. @ 1,510,	Aug. 13, 1945.	Min. ** sometimes dry.
<u>Monthly:</u>	Max. @ 1,210,	Aug. 1943.	Min. ** sometimes dry.
<u>Yearly:</u>	Max. 748,	1943.	Min. 491, 1940.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	154	54.1	277	1,130	666	526	851	836	907	268	176	155
2	152	123	346	1,180	676	717	775	897	874	280	178	159
3	148	126	425	1,130	685	836	739	906	810	279	179	176
4	155	134	359	792	815	810	742	1,180	835	273	170	165
5	155	130	205	827	805	751	862	1,220	794	267	197	154
6	43.8	135	180	1,080	798	728	972	1,060	833	270	192	151
7	0	134	202	1,080	769	904	1,020	975	769	267	175	155
8	0	136	210	1,100	641	986	974	961	935	265	173	145
9	0	133	198	1,180	687	1,270	935	883	877	258	172	146
10	0	134	182	1,240	805	1,100	1,090	916	748	258	170	143
11	0	132	172	962	848	980	1,170	921	663	258	169	144
12	0	132	158	1,040	613	930	1,110	851	553	251	161	143
13	0	132	149	1,020	469	843	1,050	949	568	256	163	147
14	0	132	143	1,190	434	881	1,090	792	835	278	166	143
15	0	131	145	1,140	422	1,020	1,020	1,000	655	230	169	139
16	0	132	140	962	426	1,140	1,140	1,100	449	223	165	141
17	0	130	132	1,010	519	1,040	1,140	1,070	488	217	171	138
18	0	124	762	1,160	526	1,040	1,070	996	465	221	165	135
19	0	123	841	1,050	511	1,330	1,070	1,040	394	218	161	136
20	0	122	749	830	693	1,230	1,050	771	359	213	160	133
21	0	124	639	753	750	868	979	1,080	333	205	156	135
22	0	126	705	716	696	705	922	882	314	198	152	135
23	0	128	907	702	642	743	901	944	303	197	159	131
24	0	130	1,130	659	698	732	869	1,090	295	198	157	128
25	0	133	1,060	665	603	683	862	1,180	281	198	156	133
26	0	309	954	770	592	678	916	910	276	194	153	130
27	78.7	356	1,190	1,030	613	757	947	886	260	193	154	132
28	120	276	1,150	975	569	724	1,030	822	252	186	156	132
29	52.9	1,130	778	526	735	1,000	762	245	182	156	130	
30	0	1,310	764	509	1,020	967	859	242	180	154	127	
31	0	1,250	489			922	742		177			137
Sum			4,111.1	28,913	26,705		29,481		7,158	4,398		
			1,059.4	17,400	19,455	30,185		16,612	4,983			

Current Year 1947

Month	Extreme Gage Feet			Extreme Second-Feet		Average Second-Feet	Total Acre-Feet	Acre-Feet				
	High		Low	High				Average	Maximum	Minimum		
	High	Low		Day	Day							
Jan.	5.56	4	180	4	6	0	34.2	2,100	2,279	8,110		
Feb.	7.07	27	385	1	0	147	8,150	12,490	19,500	5,170		
Mar.	10.99	5.01	29	1,490	14	119	561	34,500	38,806	50,100		
Apr.	11.42	7.82	14	1,690	24	628	964	57,300	58,456	45,800		
May	9.05	6.66	11	942	15	370	628	38,600	50,811	36,600		
June	10.57	7.11	20	1,400	1	474	890	53,000	54,870	49,100		
July	10.19	8.21	17	1,250	4	709	974	59,900	60,320	42,600		
Aug.	11.04	6.74	19	1,520	13	370	951	58,500	62,320	44,000		
Sept.	10.12	5.62	1	1,220	28	212	554	32,900	45,250	32,900		
Oct.	6.59	5.57	14	341	31	170	231	14,200	24,900	13,100		
Nov.	6.14	4.94	4	254	14	86.6	166	9,880	13,967	5,650		
Dec.	5.86	5.22	3	195	19	108	142	8,720	14,309	8,440		
Yearly	11.42			1,690	0	522	377,750	438,778	541,610	356,622		

The average, maximum, and minimum discharges for January through May are for period 1939-1947.

* And other days @ Beginning June 1938 ** Except for seepage of less than 2.0 second-feet

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. Prior to July 29, 1944 the station was located 1 mile below the canal intake.

RECORDS: Based upon 123 meter measurements during the year, 94 by the Mexican and 29 by the United States Section of this Commission. Computations by shifting channel methods. 1947 records good. Records available: 1938-1947.

REMARKS: In 1947, 55,256 acre-feet were distributed to 17,814 acres of land 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. Extraordinary drought in upper basin of Rio Grande led the Bureau of Reclamation to close gates at Caballo Dam on September 14 and reduce deliveries for balance of year to 30.3% of normal. Scheduled deliveries to Mexico were similarly prorated subsequent to September 14 resulting in a net delivery of 1,987.9 acre-feet less than the 60,000 acre-feet specified by the Convention of 1906.

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 January, February, October, November, and December of each year.

		Average Flow in Second-Feet		
Daily:	Max.	339, May 10, 1942.	Min.	Dry 5 months of each year.
Monthly:	Max.	283, May 1938.	Min.	Dry 5 months of each year.
Yearly:	Max.	116, 1942.	Min.	76.3 1941.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			3.5	70.6	162	187	146	161	158	21.2		
2			0	118	214	166	155	153	170			
3			0	109	225	171	156	162	161			
4			0	113	228	176	157	160	152			
5			21.2	110	218	173	160	166	158			
6			38.8	117	225	169	159	164	165			
7			33.9	111	224	169	154	158	162			
8			29.0	112	207	173	150	157	163			
9			25.1	111	228	169	150	152	160			
10			24.7	109	235	176	163	156	158			
11			23.7	112	225	166	157	156	168			
12			22.6	120	219	166	151	156	160			
13			29.0	120	223	162	150	190	160			
14			24.7	112	230	170	149	159	165			
15			25.8	105	230	169	159	168	142			
16			26.1	114	214	168	154	184	137			
17			25.8	112	216	167	165	226	86.2			
18			27.5	113	201	161	161	199	83.0			
19			27.2	113	211	157	159	187	71.3			
20			32.8	111	209	162	156	170	56.5			
21			25.4	109	215	158	141	157	50.5			
22			30.4	110	224	159	141	170	49.4			
23			29.0	111	225	164	137	186	49.1			
24			31.8	116	227	168	135	271	50.5			
25			31.1	115	221	163	148	178	50.9			
26			29.3	117	222	159	159	156	47.0			
27			35.7	114	223	149	157	153	45.6			
28			31.8	113	209	149	168	145	45.2			
29			32.1	108	208	154	176	147	45.2			
30			39.9	115	214	154	181	148	45.2			
31			37.4		214		183	143				

Month	1938-47		Current Year 1947				Period 1938-1947		
			Extreme Second-Feet		Average Second- Feet	Total Acre-Feet	Acre-Feet		
	Average Rainfall Inches	Rainfall Inches	High Day	Low Day			Normal	Maximum	Minimum
Jan.	.48	.66			0	0	0	0	0
Feb.	.27	T			0	0	0	0	0
Mar.	.34	.35	31	65.3	#	0	1,580	2,367	5,540
Apr.	.22	.03	2	136	1	26.8	111	6,650	7,535
May	.47	1.00	4	269	#	191	218	13,380	13,694
June	.82	.52	1	219	27	144	165	9,830	10,892
July	1.24	.58	17	257	17	67.5	156	9,590	10,245
Aug.	1.39	1.97	24	307	19	91.1	169	10,390	9,315
Sept.	1.21	.18	1	188	#	45.2	110	6,570	7,907
Oct.	1.04	.38	1	45.2	#	0	0.7	42.1	114
Nov.	.38	.46					0	0	0
Dec.	.62	.66					0	0	0
Yearly	8.48	6.79		307		0	80.1	58,012.1	62,069
								83,930	55,320

Various days of the month e Prorated delivery September 15-30

DIVERSIONS FROM THE RIO GRANDE IN THE EL PASO VALLEY OF TEXAS

RECORDS: July 1, 1938 to December 31, 1947.

REMARKS: The diversions of water listed below were made for use on lands in the El Paso Valley of Texas, lying between the American Dam and Fort Quitman gaging stations. The diversions were measured for 73,302 acres, or 98.7% of the total area. Of this area 56,420 acres lie in El Paso County and the remainder within the Hudspeth County Conservation and Reclamation District Number One. For 1,000 acres, (or 1.3% of the total area) lying below the Hudspeth District and above the Fort Quitman gaging station, the diversions were estimated. From two diversions (the Franklin Canal below the Leon Street Wasteway and the Riverside Canal), there has been deducted the estimated volume of water spilled back to the river at 3 points, viz.: 9.0, 19.0, and 26.1 river miles below the American Dam at El Paso, Texas. There is considerable re-use in this area of drainage and waste water from within the area. Final drainage water returns to the Rio Grande.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	295	1,065	779	441	983	826	970	146	153	122
2	0	5.1	307	1,397	679	548	786	734	926	182	187	122
3	0	8.1	392	1,310	676	709	755	626	857	194	213	135
4	0	5.1	460	682	754	797	753	1,013	* 823	219	172	128
5	0	14.2	301	813	866	807	774	1,058	* 773	219	169	126
6	0	12.2	240	1,103	820	593	953	945	693	310	301	130
7	0	8.1	227	1,093	730	882	945	962	757	256	294	87.2
8	0	10.1	239	1,135	646	920	959	845	724	216	293	103
9	0	6.1	225	1,034	457	1,088	930	909	923	204	274	158
10	0	9.1	242	1,221	556	1,104	532	888	823	198	112	149
11	0	16.2	166	1,025	346	1,026	1,128	929	704	186	211	92.3
12	0	9.1	133	982	698	975	1,117	904	580	162	198	106
13	0	8.1	125	1,056	588	911	1,023	1,007	185	213	195	123
14	0	13.2	124	1,165	531	800	1,142	730	567	231	220	104
15	0	18.3	120	979	520	1,024	803	1,062	773	232	196	195
16	0	13.2	118	920	438	1,281	* 1,043	1,035	545	224	184	180
17	0	0	84.2	1,003	517	936	* 1,103	983	391	216	157	163
18	0	0	477	945	507	* 744	1,059	452	174	244	145	154
19	0	6.1	743	901	584	* 731	1,007	530	442	81.1	145	149
20	0	47.7	729	684	649	1,335	1,245	850	86.2	211	111	148
21	0	57.8	322	699	766	728	1,064	902	97.3	224	114	104
22	0	10.1	390	697	741	644	918	845	312	188	100	119
23	0	54.8	444	692	672	737	946	710	296	155	116	105
24	0	73.0	1,133	626	698	713	850	762	281	158	130	92.3
25	0	79.1	872	513	584	709	825	771	251	154	125	99.4
26	0	78.1	851	666	585	635	892	819	243	99.4	136	51.7
27	0	338	1,178	840	557	629	1,082	808	230	147	129	5.1
28	0	316	1,079	1,029	524	548	1,028	856	170	195	140	3.0
29	0	1,089	846	479	465	730	737	75.0	161	134	91.3	
30	0	820	686	449	788	826	784	142	221	116	88.2	
31	0	1,159	1,159	493	954	814	121					42.6
Sum		1,216.9		27,807		24,246		26,096	5,967.5		3,476.1	
0		15,084.2		18,829		29,155		15,413.5	5,170			

Month	Current Year 1947						Period 1938-1947 **				
	1938-47		Extreme Second-Feet #		Average Second-Feet	Total Acre-Feet	Acre-Feet				
	Average Rainfall Inches	Day	High	Low			Normal	Maximum	Minimum		
Jan.	.52	.70	0	0	0	0	287	914	0		
Feb.	.29	T	27	338	1	0	43.5	2,410	15,010	2,410	
Mar.	.36	.38	27	1,178	17	84.2	487	29,900	35,648	46,340	21,600
Apr.	.24	.04	2	1,397	25	513	927	55,200	56,403	69,050	49,400
May	.51	1.07	5	866	11	346	607	37,300	49,573	67,100	37,300
June	.88	.56	20	1,335	1	441	808	48,100	53,952	68,580	48,100
July	1.34	.63	20	1,245	10	532	940	57,800	58,098	63,600	44,200
Aug.	1.50	2.12	15	1,062	18	452	842	51,800	58,770	75,640	48,020
Sept.	1.30	.19	1	970	29	75.0	514	30,600	39,520	49,090	22,500
Oct.	1.12	.41	6	310	19	81.1	192	11,800	18,444	25,700	8,480
Nov.	.41	.49	6	301	22	100	172	10,300	14,271	17,800	9,960
Dec.	.67	.71	15	195	28	3.0	112	6,890	10,697	13,640	6,890
Yearly	9.14	7.30		1,397		0	472	342,100	405,530	500,680	342,100

* Partly estimated ** January through June for the period 1939-1947, and July through December for the period 1938-1947 * Mean daily \diamond Valley floor El Paso to Fort Quitman

DIVERSIONS FROM THE RIO GRANDE BETWEEN

AMERICAN DAM AND INTERNATIONAL DAM Near El Paso, Texas

Two small diversions on the American side and none on the Mexican side were made in this section in 1947, either directly from the Rio Grande, or from the American Canal. From information furnished by the American Smelting and Refining Company and the Globe Mills, Inc., and from frequent inspection, it is estimated that the Smelter diversions averaged 1 second-foot and the Globe Mill diversions averaged .14 second-foot. Thus a total of 825 acre-feet was diverted.

**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 Acufia, 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 northward from 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 23 meter measurements during the year. Irrigation from this canal extension first began in June 1938. 1947 records good. Records of canal discharge began April 1, 1939 and extend to December 31, 1947.

REMARKS: From this canal extension in 1947, there were 13,478 acres of land irrigated, northward and southward from Eagle Pass. Under the Maverick Canal above the power plant, the Maverick County Water Control and Improvement District reported that in 1947 the cultivated area was 5,848 acres, all of which were irrigated. 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

<u>Daily:</u>	Max. 255, Nov. 4, 1944.	Min. " 18.7	sometimes dry.
<u>Monthly:</u>	Max. 194, Nov. 1945.	Min. " 18.7	Mar. 1939.
<u>Yearly:</u>	Max. 160, 1947.	Min. 62.1	1939.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	153	127	160	176	128	107	135	197	149	189	195	144
2	156	131	171	183	127	133	149	185	160	193	185	144
3	155	153	166	173	122	148	147	176	162	191	193	153
4	154	176	165	176	126	139	147	154	174	184	195	159
5	154	179	164	162	141	162	156	146	173	181	197	162
6	150	178	167	163	150	160	170	144	173	187	192	162
7	151	172	175	163	153	158	178	141	176	185	190	163
8	153	177	173	155	149	158	204	143	176	195	191	158
9	143	184	25.5	151	145	156	194	144	179	202	186	157
10	129	182	9.9	152	137	176	206	147	179	196	194	157
11	128	175	115	168	118	176	207	145	189	192	192	152
12	128	176	165	172	109	179	206	150	181	186	191	151
13	129	174	151	180	115	178	206	167	179	194	173	151
14	128	170	148	178	122	185	206	163	186	170	173	157
15	127	177	139	177	122	176	206	165	183	198	178	140
16	128	183	152	180	111	186	206	164	191	197	181	120
17	128	177	151	179	112	195	206	170	195	201	151	125
18	128	174	152	176	116	196	206	167	189	196	117	139
19	127	169	167	177	113	157	206	174	184	190	115	139
20	127	171	159	163	112	168	206	179	186	200	115	138
21	126	168	159	185	114	157	206	168	183	198	113	141
22	126	169	153	182	114	157	206	174	193	198	109	137
23	126	179	167	183	113	148	206	171	190	195	111	139
24	126	165	161	178	113	157	206	176	191	197	118	139
25	127	168	157	135	116	122	206	174	191	197	146	143
26	127	158	165	116	115	125	206	159	189	190	146	142
27	124	160	162	115	116	125	205	143	185	192	149	141
28	125	162	168	125	110	123	200	141	175	192	146	146
29	126	157	127	105	127	127	199	135	191	199	146	144
30	126	178	127	114	123	197	199	139	188	183	149	157
31	127	169	112	201	150					187		170
Sum	4,732	4,877	4,575	4,951	5,956							4,568
	4,162	4,674.4	3,770	* 5,985	5,440							4,837

Month	1924-47		Current Year 1947				Period 1939-1947		
			Extreme Second-Feet		Average Second-Feet		Acre-Feet		
			High	Low	Day	Day	Total	Average	Maximum
Average Rainfall Inches	Day	Day	High	Low	Day	Day	Acre-Feet	Average	Maximum
Jan.	.99	2.60	167	6	105	134	8,260	7,689	* 10,600
Feb.	.70	.24	194	1	112	169	9,390	6,920	10,600
Mar.	.88	.92	30	212	11	8.1	9,270	7,412	* 9,940
Apr.	1.62	1.32	1	216	8	83.5	163	7,206	10,300
May	3.35	3.35	7	170	12	69.1	122	7,480	6,122
June	2.36	3.32	17	212	24	58.2	152	9,070	6,694
July	1.73	1.14	31	215	1	88.9	* 193	* 11,900	9,520
Aug.	1.78	3.51	1	213	30	114	160	9,820	7,450
Sept.	2.79	1.15	11	210	2	127	181	10,000	10,100
Oct.	1.66	.95	9	225	15	133	192	11,800	8,501
Nov.	.76	1.20	5	215	24	* 92.1	161	9,590	11,800
Dec.	1.15	.46	31	185	16	102	147	9,060	5,130
Yearly	19.77	20.16	225	8.1	160	116,110	91,187	116,110	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 1,148,200 acre-feet to this area is made almost entirely by pumping from the river to irrigate 558,234 acres. Diversions were actually measured for 92% 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 return 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 36,483 acres of dry-farmed land within the area. More than one crop per year is often grown on some of the land.

		<u>Average Flow in Second-Feet</u>					
Daily ♦:	Max.	3,770,	June 27, 1947.	Min.	0.8	Dec. 25, 1938.	
Monthly ♦:	Max.	2,610,	July 1946.	Min.	25.2	June 1930.	
Yearly:	Max.	1,590,	1947.	Min.	653,	1941.	

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	758	2,110	773	2,290	1,150	90.8	3,270	711	1,180	3,040	1,310	1,720
2	487	2,080	1,010	2,280	1,270	683	3,130	553	2,160	2,990	1,550	1,570
3	663	2,640	2,280	1,950	1,260	776	3,220	533	1,870	2,870	2,710	1,570
4	450	2,590	2,180	1,900	1,070	1,150	3,140	521	1,410	2,540	2,410	1,480
5	269	2,410	1,980	1,480	2,040	1,320	3,070	715	1,420	2,160	2,390	1,340
6	961	2,560	1,930	1,130	2,190	1,190	2,720	859	837	2,350	2,200	784
7	1,120	2,740	1,920	2,010	2,350	1,120	2,640	1,120	654	2,450	2,030	564
8	1,200	2,490	1,380	1,930	2,050	1,280	2,450	1,040	2,030	2,500	1,720	1,400
9	846	2,050	1,230	1,550	1,850	2,080	2,520	642	2,210	2,320	1,420	1,610
10	379	2,290	2,190	909	1,360	1,980	2,420	747	2,180	2,160	2,250	1,180
11	318	2,310	1,980	1,940	1,220	1,840	2,180	1,080	1,850	1,730	2,220	665
12	305	2,360	1,930	1,270	1,800	1,650	2,000	1,010	1,830	1,460	2,060	532
13	727	2,650	1,700	636	1,740	324	2,010	750	1,370	2,320	1,960	146
14	887	2,570	1,960	1,220	1,510	430	2,270	568	1,986	2,180	1,660	44
15	1,090	2,120	1,400	1,550	2,440	1,160	2,150	297	2,450	1,950	1,070	75.5
16	885	1,640	972	1,770	2,920	2,150	1,880	430	2,550	1,880	703	446
17	759	2,570	2,110	1,760	2,760	2,200	1,710	14.1	2,500	1,860	1,420	529
18	296	2,590	2,140	1,530	2,190	2,400	1,380	208	2,620	1,730	2,440	135
19	404	2,490	1,870	950	1,660	2,390	607	376	2,650	1,500	2,230	139
20	962	2,410	1,920	977	1,020	2,550	1,180	332	2,270	2,190	2,420	81.8
21	1,400	2,240	1,860	1,850	810	3,220	2,210	301	1,880	2,510	2,430	174
22	1,260	1,610	1,470	1,850	661	3,560	2,040	707	2,900	2,540	1,540	690
23	1,460	1,390	1,240	1,590	622	3,710	1,720	324	3,110	2,030	969	710
24	1,360	2,250	2,290	1,400	191	3,620	1,620	103	3,100	1,960	1,240	412
25	1,430	1,170	2,240	978	76.2	3,610	740	500	3,040	1,700	1,660	3.4
26	1,100	644	2,010	187	196	3,730	883	787	2,760	1,370	637	288
27	2,020	667	2,160	505	322	3,770	1,590	861	2,880	2,180	549	304
28	2,020	828	2,220	816	189	3,680	2,440	959	2,420	1,960	870	217
29	2,220	1,740	809	280	3,440	2,180	1,150	2,930	1,900	744	774	
30	2,150	1,420	1,040	58.3	3,560	1,790	589	3,130	1,860	815	1,070	
31	2,190	2,250	173	1,440	1,440	1,440	277	1,750				
Sum	58,469	55,755	42,057	39,408.5	64,603.8	19,064.1			65,900	21,760.1		
	32,376				64,600	65,157				49,627		

Month	Current Year 1947				Period 1922-1947				Acre-Feet		
	1922-47		# Extreme Second-Feet		Average Second-Feet		Total		Acre-Feet		
	Average Rainfall	Inches **	High	Low	Day	Day	Acre-Feet	Normal	Maximum	Minimum	Normal
Jan.	1.59	.80	29	2,220	5	269	1,040	64,200	38,558	71,000	7,700
Feb.	.97	.61	7	2,740	26	644	2,090	116,000	63,235	134,000	6,960
Mar.	1.20	.22	24	2,290	1	773	1,800	111,000	88,378	156,000	14,100
Apr.	1.33	2.10	1	2,290	26	187	1,400	83,400	74,197	125,000	29,300
May	3.44	4.25	16	2,920	30	58.3	1,270	78,200	67,666	135,000	14,510
June	2.80	.86	27	3,770	1	90.8	2,150	128,000	60,912	129,000	1,500
July	1.90	.92	1	3,270	19	607	2,080	128,000	67,530	161,000	10,000
Aug.	2.23	8.48	29	1,150	17	14.1	615	57,800	74,544	132,000	19,100
Sept.	4.60	.55	30	3,130	7	654	2,170	129,000	54,346	8,020	95,896
Oct.	2.14	.83	1	3,040	26	1,370	2,130	131,000	58,734	21,400	72,515
Nov.	1.31	2.19	3	2,710	27	549	1,650	98,400	58,705	128,000	11,500
Dec.	1.82	1.21	1	1,720	25	3.4	702	43,200	110,000	10,400	66,746
Yearly	25.33	23.02		3,770		3.4	1,590	1,148,200	750,009	1,148,200	472,500

♦ Period 1938-1947 ** Lower Rio Grande Valley Area on the U. S. Side, Rio Grande City to the Gulf.

Mean daily

DIVERSIONS FROM THE RIO GRANDE INTO THE RETAMAL CANAL
Near Rio Bravo, Tamaulipas

DESCRIPTION: Water-stage recorder and cable with car located .87 mile below canal head gate. Zero of the gage is .85 feet 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 upon 160 meter measurements during the year. Computations by shifting channel methods. 1947 records good. Records available: September 1939 to December 1947.

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, but in 1947 there was no such escape. In 1947 123,552 acres with irrigation facilities were cultivated under Retamal Canal, of which 65,977 acres were irrigated with 88,750 acre-feet of water, and 57,575 acres were dry farmed.

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

<u>Daily:</u>	Max.	6,920,	Sept. 12, 1944.	Min.	sometimes dry.
<u>Monthly:</u>	Max.	3,280,	Sept. 1944.	Min.	sometimes dry.
<u>Yearly:</u>	Max.	700,	1944.	Min.	232, 1943.

CORRECTION: The extreme high second-feet for August 1946 as published in Water Bulletin No. 16 should be changed to 2,010 second-feet on August 31.

Mean Daily Discharge in Second-Feet 1947 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	388	367	374	120	282	420	710	98.5	1,210	434	103	360
2	396	403	353	107	332	399	618	299	1,210	378	420	317
3	385	378	308	89.0	307	353	491	1,540	1,200	343	420	303
4	381	339	207	67.5	243	314	388	3,710	1,080	311	248	298
5	388	350	168	52.3	280	228	338	4,410	1,010	311	173	299
6	392	335	179	79.8	230	199	314	4,840	1,030	290	132	330
7	392	307	174	111	137	169	300	3,990	1,120	262	175	348
8	399	279	174	47.0	73.5	169	249	3,110	1,210	263	202	353
9	410	346	183	48.7	39.9	156	200	2,250	1,090	235	211	304
10	417	381	241	77.3	30.4	0	163	1,530	950	220	216	277
11	413	352	192	95.0	35.7	0	148	1,160	788	213	142	307
12	424	314	169	43.4	52.3	0	187	1,010	650	244	89.7	349
13	434	254	189	83.0	31.1	33.5	224	905	622	233	55.4	381
14	427	204	206	314	352	142	215	833	682	182	41.0	399
15	403	201	195	512	996	172	171	763	1,550	176	57.2	406
16	424	236	215	509	1,090	129	114	720	2,190	150	179	413
17	424	277	240	293	830	214	110	713	1,570	119	246	406
18	441	221	171	127	653	285	109	766	1,240	127	226	378
19	466	203	155	76.3	629	229	173	763	1,070	187	257	345
20	459	195	126	106	869	360	220	643	911	244	424	347
21	420	183	93.9	81.9	1,630	1,260	163	590	897	441	367	353
22	403	213	106	33.9	1,510	2,450	37.4	544	872	417	255	360
23	445	293	133	20.5	1,200	1,760	20.5	1,160	953	241	* 288	336
24	509	336	239	16.2	1,100	999	21.9	1,370	1,450	156	* 345	303
25	516	297	214	14.1	918	784	209	1,050	1,050	159	* 360	312
26	509	313	209	45.2	1,070	2,890	326	840	816	182	420	330
27	491	364	178	161	1,590	4,060	322	805	692	205	470	327
28	399	388	136	212	1,270	3,510	213	968	629	194	558	314
29	339	134	228	908	1,800	73.5	922	590	103	501	307	
30	346	155	255	625	940	43.8	869	505	71.0	420	275	
31	360	191		484			48.7	1,030		47.7		256
Sum			8,329	4,026.1	24,424.5	44,201.5	7,138.7	10,393				
Sum			13,000	6,007.9	19,797.9	6,920.8	30,837	8,001.3				

Month	1922-47		Current Year 1947				Period 1939-1947 *		
	Average Rainfall Inches	Day	Extreme Second-Feet		Average Second- Feet	Total Acres-Feet	Acre-Feet		
			High	Low			Average	Maximum	Minimum
Jan.	1.59	.80	25	523	30	340	419	25,790	2,090
Feb.	.97	.61	#	413	21	179	297	16,520	85.1
Mar.	1.20	.22	1	385	22	104	194	7,216	0
Apr.	1.33	2.10	15	558	25	12.0	134	8,840	0
May	3.44	4.25	21	1,770	11	26.5	659	39,270	25,064
June	2.80	.86	27	4,100	#	0	814	40,780	4,490
July	1.90	.92	1	784	23	19.4	223	13,730	18,740
Aug.	2.23	8.48	6	4,910	1	63.2	1,430	87,670	48,580
Sept.	4.60	.55	16	2,360	30	477	1,030	61,170	360
Oct.	2.14	.83	1	466	31	42.7	230	14,160	1,590
Nov.	1.31	2.19	28	579	1	47.3	267	15,870	2,400
Dec.	1.82	1.21	16	413	31	249	335	20,610	1,080
Yearly	25.33	23.02		4,910	0	502	363,150	299,553	508,160
								168,290	

* Partly estimated # Various days of the month * Record began September 1, 1939

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 (See Outfalls from Wells, page 10, hereof) 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, the others from the Rio Grande. Because of changing conditions, the period records are limited here to the past ten years.

In The United States

Month	El Paso (Pop. 130,000 ***)			Del Rio (Pop. 15,000 ***)		
	1947	Period 1943-1947		1947	Period 1938-1947	
		Average	Maximum		Normal	Maximum
Jan.	49.2	30.0	70.6	0	88.0	81.9
Feb.	169.4	49.3	169.4	0	90.0	84.4
Mar.	453.7	272.2	453.7	63.4	140.0	120.2
Apr.	575.4	477.7	575.4	363.6	138.1	130.8
May	452.2	489.7	552.6	430.3	199.1	154.2
June	651.5	623.5	746.9	536.3	232.5	179.0
July	736.7	668.5	736.7	538.1	296.1	204.3
Aug.	666.9	577.6	666.9	514.4	207.9	184.0
Sept.	653.1	481.0	653.1	207.7	217.5	152.4
Oct.	707.2	402.0	707.2	193.4	232.9	117.2
Nov.	636.1	342.3	636.1	176.8	214.8	102.2
Dec.	774.0	332.1	774.0	139.8	130.2	86.2
Yearly	6,525.4	4,745.9	6,525.4	4,049.5	* 2,187.1	1,596.8
					2,187.1	1,016.5

Month	Eagle Pass (Pop. 11,590 ***)			Laredo (Pop. 50,000 ***)		
	1947	Period 1938-1947		1947	Period 1938-1947	
		Normal	Maximum		Normal	Minimum
Jan.	44.9	49.6	63.5	38.9	323.3	297.0
Feb.	57.0	52.6	62.7	44.0	366.4	366.4
Mar.	73.5	64.1	76.6	48.5	473.8	329.1
Apr.	65.9	69.0	79.4	60.3	471.1	356.2
May	62.3	67.3	86.9	55.0	492.6	379.8
June	77.8	79.0	108.0	40.0	581.4	410.9
July	95.6	96.3	113.3	77.3	638.8	451.4
Aug.	75.4	91.2	112.4	73.9	474.1	458.3
Sept.	87.7	77.7	90.5	49.6	601.1	386.1
Oct.	71.2	64.9	92.1	41.0	549.9	350.6
Nov.	47.8	58.7	99.9	47.9	353.1	311.7
Dec.	55.6	55.2	68.1	46.2	320.8	276.4
Yearly	814.7	825.6	905.0	756.1	5,646.4	4,219.5
						5,874.9
						2,450.6

Month	Roma (Pop. 1,400 ***)			Rio Grande City (Pop. 2,500 ***)			Brownsville (Pop. 29,000 ***)		
	1947	Period 1938-1947		1947	Period 1938-1947		1947	Period 1938-1947	
		Normal	Maximum		Normal	Maximum		Normal	Maximum
Jan.	6.2	6.7	14.3	2.4	19.4	20.2	36.7	14.7	273.9
Feb.	6.6	6.7	12.9	2.4	22.2	19.7	29.5	14.8	268.1
Mar.	9.0	6.2	9.5	2.0	29.0	25.7	35.4	19.5	136.2
Apr.	9.3	6.4	9.5	2.7	29.9	28.1	36.2	18.8	341.3
May	10.7	7.8	14.3	2.2	32.7	30.9	38.4	21.1	170.6
June	11.1	8.0	13.8	2.2	34.9	29.1	34.9	19.4	424.0
July	13.0	8.6	14.3	3.0	38.3	33.4	49.7	17.1	178.8
Aug.	7.9	8.0	14.3	3.5	30.9	34.7	54.0	18.5	319.5
Sept.	10.9	7.4	13.8	2.5	55.2	29.3	40.7	17.1	372.2
Oct.	9.5	6.0	9.5	2.9	34.8	27.2	37.9	19.0	383.8
Nov.	7.2	5.7	9.2	2.6	27.2	23.4	35.4	15.9	326.9
Dec.	5.8	5.2	9.5	2.3	22.9	21.1	36.0	13.9	279.6
Yearly	107.2	82.7	135.5	44.3	357.4	322.8	402.2	218.0	4,241.3
								2,071.5	1,071.0

In Mexico

Month	Nuevo Laredo (Pop. 28,872 **)			Guerrero (Pop. 1,786 **)			Matamoros (Pop. 15,699 **)		
	1947	Period 1938-1947		1947	Period 1943-1947		1947	Period 1942-1947	
		Normal	Maximum		Average	Maximum		Normal	Maximum
Jan.	218.2	131.0	218.2	94.4	4.3	4.9	5.5	4.3	85.3
Feb.	233.3	133.4	233.3	97.2	4.3	4.5	4.7	4.3	77.1
Mar.	288.3	167.6	288.3	108.6	5.0	5.4	6.3	5.0	90.6
Apr.	298.7	186.4	298.7	132.7	5.6	6.5	7.3	5.6	92.6
May	314.2	197.0	314.2	122.8	7.3	7.5	8.0	7.1	100.3
June	337.4	199.8	337.4	129.6	7.8	8.2	8.5	7.8	103.6
July	355.7	224.5	367.7	115.2	9.3	9.3	10.1	8.8	116.2
Aug.	333.2	228.0	355.3	117.9	10.1	10.6	11.3	10.1	100.4
Sept.	294.9	191.6	294.9	113.0	8.5	8.4	9.0	7.3	82.9
Oct.	278.2	182.8	278.2	105.8	8.3	7.8	8.8	6.5	117.4
Nov.	207.9	159.8	260.4	99.3	6.8	6.3	7.3	4.9	84.1
Dec.	197.4	146.6	247.9	96.3	5.5	5.6	6.3	5.0	80.7
Yearly	3,357.4	2,148.5	3,357.4	1,504.7	82.8	85.0	87.5	82.4	1,131.2
								995.9	1,131.2
									*821.1

* Estimated * Partly estimated ** 1940 census *** 1947 estimate

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. 382, 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.

Month	1947					Period of Record		
	Tons		Number of Samples	Gravimetric Percentages			Acre-Feet at 1,452 Tons Per Acre-Foot	Period
	Water	Silt		Average	Maximum Sample	Minimum Sample		
Jan.								
Feb.								
Mar.								
Apr.								
May								
June								
July								
Aug.								
Sept.	55,204,000	33,950	30	.06150			23.4	
Oct.	10,852,000	1,433	25	.00722			1.0	
Nov.	14,141,000	1,160	30	.00820			.8	
Dec.	12,965,000	699	26	.00512			.5	
Yearly								

Rio Grande at El Paso

Period Sept.-Dec. 1947

Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.	55,204,000	33,950	30	.06150			23.4		
Oct.	10,852,000	1,433	25	.00722			1.0		
Nov.	14,141,000	1,160	30	.00820			.8		
Dec.	12,965,000	699	26	.00512			.5		
Yearly									

Samples by U.S. Section, Method A, Analysis by U.S. Section, Method 1.

Rio Conchos at Cuchillo Parado, Chihuahua

Period 1945-1947

Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.	75,885,000	0	14	0	0	0	0	0	0
Oct.	67,305,000	0	12	0	0	0	0	0	0
Nov.	44,707,000	0	13	0	0	0	0	0	0
Dec.	11,449,000	0	13	0	0	0	0	0	0
Yearly									

Samples by Mexican Section, Method B, Analysis by Mexican Section, Method 2

Rio Grande at Langtry

Period April 1944-1947

Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.	118,158,000	12,761	6	.01080			8.8	10.2	8.8
Oct.	107,008,000	4,847	6	.00953			3.3	6.1	5.5
Nov.	85,935,000	6,875	5	.00860			4.7	5.6	4.7
Dec.	38,751,000	1,581	9	.00408			1.1	2.2	1.1
Yearly							120.7	116.8	117.6

Samples by U.S. Section, Method A, Analysis by U.S. Section, Method 1

Period 1945-1947

Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.	118,158,000	12,761	6	.01080			8.8	10.2	8.8
Oct.	107,008,000	4,847	6	.00953			3.3	6.1	5.5
Nov.	85,935,000	6,875	5	.00860			4.7	5.6	4.7
Dec.	38,751,000	1,581	9	.00408			120.7	116.8	117.6
Yearly							1,720.9	1,711.0	1,720.9

Samples by Mexican Section, Method B, Analysis by Mexican Section, Method 2

Period 1945-1947

Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.	23,251,000	435	15	.00187			.30	.51	.74
Oct.	17,812,000	971	14	.00945			.67	.64	.40
Nov.	19,882,000	421	15	.00215			.29	.65	.29
Dec.	15,908,000	282	15	.00177			.19	.49	.19
Yearly							21.66	6.78	.64

Samples by U.S. Section, Method A, Analysis by U.S. Section, Method 1

Period 1944-1947

Jan.									
Feb.									
Mar.									
Apr.									
May									
June									
July									
Aug.									
Sept.	23,251,000	435	15	.00187			.30	.51	.74
Oct.	17,812,000	971	14	.00945			.67	.64	.40
Nov.	19,882,000	421	15	.00215			.29	.65	.29
Dec.	15,908,000	282	15	.00177			.19	.49	.19
Yearly							21.66	6.78	.64

Samples by Mexican Section, Method B, Analysis by Mexican Section, Method 2

Period 1944-1947

SUSPENDED SILT IN THE RIO GRANDE AND SOME TRIBUTARIES AND DIVERSIONS

Month	1947						Period of Record		
	Tons		Number of Samples	Gravimetric Percentages			Acre-Feet at 1,452 Tons Per Acre-Foot		
	Water	Silt		Average	Maximum Sample	Minimum Sample	Average	Maximum	Minimum

Rio Grande at Eagle Pass

									Period 1934-1947
Jan.	230,135,000	34,121	27	.0155			23.5	25.5	124.0
Feb.	129,191,000	12,778	25	.0069			8.8	15.7	32.1
Mar.	166,427,000	34,617	25	.0208			23.8	26.6	32.6
Apr.	165,757,000	16,999	24	.0104			7.6	54.6	187.9
May	207,354,000	298,590	23	.1140			20% ^b	64.3	4.7
June	218,312,000	284,786	25	.1300			196.0	894.1	204.3
July	121,068,000	17,741	22	.0144			12.0	1,230.0	17.7
Aug.	231,252,000	1,275,208	28	.5500			878.7	1,139.0	306.9
Sept.	183,372,000	3,137,091	27	.6900			2,160.5	3,104.1	10,802.8
Oct.	146,584,000	34,835	25	.0237			24.0	1,260.6	3,816.7
Nov.	153,374,000	64,110	29	.0418			44.2	95.1	305.5
Dec.	170,914,000	18,801	30	.0110			12.9	24.5	84.1
Yearly	2,411,454,000	5,223,770	309	.2166			3,597.6	8,521.1	20,842.8
									1,768.3

Samples by Mexican Section, Method A, Analysis by U.S. Section, Method 1

Rio Alamo

									Period 1934-1947
Jan.	1,373,000	0	7	0	0	0	0	.34	21.8
Feb.	465,000	0	6	0	0	0	0	.04	0
Mar.	397,000	0	7	0	0	0	0	5.2	45.4
Apr.	253,000	0	7	0	0	0	0	26.4	227.4
May	11,666,000	48,391	9	.4148	.5799	0	33.3	46.5	229.7
June	13,230,000	102,797	9	.7770	1.0991	0	70.8	69.4	2.2
July	311,000	0	6	0	0	0	0	23.3	98.8
Aug.	72,350,000	637,331	10	.8809	.9241	0	438.9	216.2	1,607.8
Sept.	11,984,000	83,796	9	.5579	.8588	0	57.6	115.8	362.9
Oct.	4,473,000	29,586	8	.6601	.8728	0	20.3	107.5	557.9
Nov.	2,053,000	4,244	7	.2067	.2970	0	2.9	1.1	5.2
Dec.	1,284,000	0	6	0	0	0	0	1.6	16.1
Yearly	122,839,000	905,885	91	.7375	1.0991	0	623.8	616.44	1,990.8
									154.5

Samples by Mexican Section, Method B, Analysis by Mexican Section, Method 2

Rio Grande at Roma

									Period March 1929-1947
Jan.	233,083,000	22,142	30	.0093			15.2	43.0	169.7
Feb.	203,819,000	14,471	27	.0071			10.0	25.5	121.0
Mar.	175,401,000	8,945	31	.0051			6.2	134.6	1,825.3
Apr.	113,820,000	12,520	30	.0110			8.6	259.4	1,345.0
May	340,851,000	815,153	26	.2330			561.4	1,301.9	5,232.4
June	513,331,000	2,646,230	29	.5150			1,822.5	1,264.4	7,216.0
July	138,553,000	16,072	31	.0116			11.1	1,330.8	9,070.0
Aug.	663,126,000	3,110,061	31	.4690			2,141.9	1,408.9	3,723.0
Sept.	557,477,000	3,874,465	30	.6950			2,668.4	3,902.3	17,996.0
Oct.	187,231,000	129,564	31	.0692			89.2	2,295.5	9,241.0
Nov.	175,673,000	137,025	30	.0780			94.4	158.9	659.7
Dec.	178,665,000	19,474	30	.0109			13.4	56.5	319.0
Yearly	3,495,330,000	10,806,122	356	.3091			7,442.3	12,141.7	30,839.0
									2,314.0

Samples by Mexican Section, Method A, Analysis by U.S. Section, Method 1

Retamal Canal

									Period 1943-1947
Jan.	35,067,000	8,100	14	.0231	.0320	.0122	5.6	5.0	10.1
Feb.	22,462,000	2,875	12	.0128	.0170	.0056	2.0	1.5	2.8
Mar.	16,208,000	2,642	13	.0163	.0198	.0120	1.8	1.8	.2
Apr.	10,846,000	3,444	12	.0317	.0322	.0108	2.4	28.8	.1
May	53,395,000	194,678	13	.3464	.7892	.0104	134.1	101.2	183.8
June	65,877,000	580,969	15	.8819	2.2456	0	400.1	180.9	400.1
July	18,659,000	18,968	13	.1016	.1394	.0060	13.1	89.3	289.8
Aug.	119,205,000	606,992	15	.5092	1.1425	.0150	418.0	215.0	615.1
Sept.	83,173,000	237,708	13	.2858	.4461	.1419	163.7	234.7	659.4
Oct.	19,253,000	9,415	14	.0489	.0990	.0109	6.5	434.8	1,529.7
Nov.	21,578,000	17,586	12	.0315	.1210	.0270	12.1	7.2	6.5
Dec.	28,023,000	7,398	13	.0261	.1290	.0120	5.1	3.3	3.6
Yearly	493,774,000	1,690,775	159	.3424	2.2456	0	1,164.5	1,373.5	1,946.1
									326.54

Samples by Mexican Section, Method B, Analysis by Mexican Section, Method 2

Rio Grande at Las Palmas

									Period 1946-1947
Jan.	180,160,000	25,222	14	.0140	.0173	.0110	17.4	83.2	149.0
Feb.	125,215,000	17,530	12	.0140	.0146	.0072	12.1	29.0	45.9
Mar.	105,567,000	6,967	13	.0066	.0092	.0041	4.8	5.7	6.6
Apr.	78,523,000	8,559	13	.0109	.0206	.0036	5.9	123.8	44.8
May	282,022,000	1,369,684	13	.4857	.9896	.0142	943.3	1,474.5	943.3
June	360,728,000	4,184,445	16	1.1600	2.6098	.0050	2,881.8	2,581.0	2,881.8
July	83,472,000	148,163	13	.1775	.3686	.0047	102.0	122.0	142.1
Aug.	634,708,000	3,704,791	15	.5837	1.1882	.0179	2,551.5	2,551.5	185.7
Sept.	143,775,000	1,753,784	13	.3997	.5744	.2112	1,207.8	1,661.2	2,114.7
Oct.	115,656,000	78,762	14	.0681	.1163	.0149	54.2	2,677.3	5,300.4
Nov.	125,384,000	116,050	12	.0926	.1512	.0318	79.9	63.0	54.2
Dec.	154,734,000	49,051	13	.0317	.1585	.0126	33.8	33.8	46.1
Yearly	2,684,864,000	11,463,008	161	.4269	2.6098	.0036	7,894.5	10,211.9	12,529.2
									7,894.5

Samples by Mexican Section, Method B, Analysis by Mexican Section, Method 2

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES 1947**

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 conductances 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.

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

Month	No. of Sam- ples	Total Tons of Per Acre- Foot	Dissolved Solids	Mean $K \times 10^5$ at 25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter				
									Ca	Mg	Na	CO_3 plus HCO_3	SO_4

Rio Grande at Caballo Dam															
Sampling by Bureau of Reclamation															
Jan.	31	.79	498	91.8	.10	7.9	49	21	3.31	1.44	4.63	3.89	3.59	1.96	.01
Feb.	28	.71	8,590	79.0	.09	7.9	44	20	3.26	1.20	3.56	3.01	3.53	1.61	T
Mar.	31	.71	55,900	80.3	.11	7.9	45	20	3.26	1.19	3.60	2.98	3.55	1.63	.01
Apr.	30	.72	88,600	80.0	.17	8.0	45	20	3.21	1.19	3.64	2.88	3.67	1.67	T
May	31	.70	60,300	80.3	.12	8.1	45	20	3.20	1.32	3.64	2.76	3.72	1.65	T
June	30	.75	84,000	82.3	.16	7.8	45	19	3.24	1.28	3.67	2.86	3.78	1.60	.03
July	31	.75	111,000	82.8	.15	8.2	46	19	3.12	1.25	3.96	2.81	3.79	1.60	.01
Aug.	31	.75	86,200	82.7	.15	8.0	46	20	3.22	1.28	3.82	2.99	3.65	1.62	.01
Sept.	30	.78	38,000	89.2	.15	8.0	47	24	3.53	1.24	4.16	3.41	3.49	2.20	.03
Oct.	31	1.32	187	154	.24	7.7	63	28	3.58	2.30	10.04	6.94	4.68	4.48	.01
Nov.	30	1.21	129	146	.24	8.0	62	26	3.46	2.33	9.57	7.06	4.40	4.10	T
Dec.	31	1.21	140	140	.28	8.0	61	26	3.44	2.25	9.00	6.88	4.16	3.85	T
Mean #	4365			82.1	.146	8.01	46	20	3.22	1.24	3.77	2.92	3.69	1.67	.011
Period Average				78.4			44	18	3.34	1.17	3.52	2.76	3.88	1.44	
Tons of Constituents, 1947									63,600	14,900	85,400	87,800	175,000	58,400	
Average Tons Period 1931-1947									76,600	16,300	92,600	96,400	213,000	58,600	

Rio Grande at Leasburg Dam															
Sampling by Bureau of Reclamation															
Jan.	5	1.19	3,070	129	.08	7.8	44	23	5.44	1.87	6.01	4.02	6.31	3.12	.01
Feb.	28	.83	8,000	91.7	.29	7.9	45	21	3.77	1.33	4.22	3.17	4.20	2.00	T
Mar.	31	.72	50,700	91.5	.11	7.9	45	21	3.42	1.23	3.85	3.07	3.80	1.78	.01
Apr.	30	.76	87,400	83.7	.04	7.9	46	20	3.42	1.25	3.82	2.96	3.86	1.75	.01
May	31	.77	61,400	86.5	.16	7.8	45	20	3.45	1.29	3.83	2.86	3.98	1.4	T
June	30	.76	77,500	86.1	.16	7.9	46	21	3.24	1.31	3.87	2.86	4.01	1.80	.01
July	31	.79	105,000	86.4	.12	7.9	45	20	3.34	1.35	3.98	3.02	4.00	1.80	.04
Aug.	31	.86	102,000	84.9	.15	8.0	47	20	3.25	1.24	4.05	3.91	3.90	1.74	.04
Sept.	30	.82	43,900	91.4	.16	7.9	46	24	3.63	1.25	4.21	3.23	3.90	2.20	.02
Oct.	4	1.05	3,280	117	.19	7.9	51	26	3.89	1.87	5.96	5.56	6.23	3.04	.02
Nov.	4	1.22	2,560	130	.19	7.9	47	24	5.18	1.96	6.37	3.56	6.73	3.31	T
Dec.	5	1.22	1,940	130	.16	8.0	46	25	5.40	1.95	6.29	3.70	6.71	3.45	T
Mean #	4260			86.4	.127	7.91	46	21	3.36	1.29	3.97	2.99	3.97	1.83	.020
Period Average				83.9			44	20	3.60	1.25	3.85	4.12	4.12	1.74	
Tons of Constituents, 1947									62,900	14,700	85,300	85,200	178,000	60,600	
Average Tons Period 1931-1947									79,200	16,700	97,200	96,900	217,000	68,000	

Rio Grande at El Paso																
Sampling by U.S. Section																
Jan.	31	1.74	17,200	193	.29	8.2	59	34	5.90	2.15	11.80	4.96	8.32	6.78	T	
Feb.	28	1.71	15,600	188	.28	7.9	60	34	5.59	2.13	11.60	4.66	8.19	6.65	.01	
Mar.	31	1.03	38,400	116	.19	8.1	51	27	4.29	1.52	6.01	3.56	5.15	3.19	.01	
Apr.	30	.91	59,200	110	.13	7.9	50	26	3.98	1.44	5.35	3.16	4.86	2.89	T	
May	31	1.07	55,400	121	.20	7.8	51	27	4.37	1.58	6.18	3.61	5.42	3.41	.04	
June	30	1.03	65,100	115	.16	8.3	52	27	4.05	1.56	6.02	3.41	5.24	3.20	.02	
July	31	1.06	73,900	118	.21	7.9	51	26	4.13	1.60	6.06	3.56	5.28	3.14	.03	
Aug.	31	1.06	82,500	118	.18	7.9	51	27	4.23	1.62	6.12	3.66	5.14	3.24	.04	
Sept.	30	1.22	49,500	135	.25	8.1	55	31	4.27	1.79	7.46	3.48	5.94	4.29	.02	
Oct.	25	1.69	24,700	184	.25	8.1	59	34	5.53	2.23	11.19	4.56	8.20	6.44	.01	
Nov.	30	1.73	18,000	192	.31	8.2	59	33	5.92	2.25	11.59	4.99	8.38	6.58	.02	
Dec.	26	1.76	16,600	194	.32	8.2	59	33	6.02	2.25	11.66	5.15	8.50	6.80	.01	
Mean #	4354			151,600	126	.196	8.00	53	28	4.36	1.65	6.74	3.65	5.61	3.67	.022
Period Average				65,000	122			52	30	4.47	1.62	6.64	3.54	5.46	3.78	
Tons of Constituents, 1947									54,500	12,500	96,700	69,500	168,000	81,200		
Average Tons Period 1930-1947									71,500	15,700	122,000	86,100	209,000	107,000		

** Percent of total cations *** Percent of total anions # Weighted mean \$ Total T-Trace

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES 1947**

Month	No. of Sam- ples	Total Tons of		Mean Kx10 ⁵ @25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter				
		Per Acre- Foot	Dissolved Solids						Ca	Mg	Na	CO ₃ + HCO ₃	SO ₄

Sampling Jointly by Both Sections

Rio Grande at Fort Quitman

Jan.	7	2.94	44,700	330	.31	8.1	61	53	9.51	3.64	20.80	4.99	11.07	18.06	.04
Feb.	4	3.14	35,200	353	.36	7.9	62	55	9.87	3.93	22.42	4.78	11.58	20.04	.04
Mar.	7	3.80	15,400	434	.44	8.1	64	61	10.74	5.18	28.12	3.63	13.55	27.07	T
Apr.	6	3.98	17,900	462	.41	8.0	64	63	10.70	5.53	29.37	2.92	14.01	29.35	T
May	6	4.58	26,200	498	.47	7.9	65	65	11.51	6.10	32.36	3.01	14.93	32.72	.03
June	5	4.09	22,700	467	.43	8.3	64	62	11.68	5.56	30.23	3.95	14.21	29.48	.03
July	6	6.55	13,100	736	.64	7.9	65	68	17.02	9.59	49.87	3.76	21.18	51.89	.01
Aug.	7	2.69	44,400	503	.31	7.9	61	55	8.28	3.63	18.96	3.95	9.94	16.94	.04
Sept.	6	4.28	23,500	482	.46	7.9	63	63	12.24	6.06	31.36	3.87	14.61	31.48	.01
Oct.	5	3.92	21,600	435	.39	8.0	63	61	11.37	4.96	28.28	4.08	13.35	27.45	.01
Nov.	6	3.61	27,100	412	.38	8.0	63	58	10.86	4.72	26.48	4.56	13.29	24.65	.01
Dec.	5	3.59	27,300	403	.41	7.8	63	58	10.57	4.61	25.95	4.26	12.98	24.15	T
Mean &	72	3.52	319,100	395	.378	7.98	63	59	10.35	4.64	25.34	4.17	12.54	23.86	.027
Period Average	2.24	560,000	255						7.32	2.94	15.78	3.53	8.34	14.22	
Tons of Constituents, 1947									25,600	6,970	71,900	15,700	74,400	104,000	
Average Tons Period 1930-1947									49,800	12,100	123,000	36,500	136,000	171,000	

Sampling by U.S. Section

Rio Grande at Upper Presidio

Jan.	5	3.00	44,400	338	.40	8.0	62	55	9.21	3.80	21.58	4.21	11.52	19.09	.03
Feb.	5	3.25	33,500	366	.41	7.9	64	57	9.36	4.11	23.89	3.57	12.50	21.35	.01
Mar.	4	3.97	15,600	138		7.9	60	58	12.88	5.22	27.36	3.88	15.29	26.72	T
Apr.	5	5.89	2,390	620	.60	7.6	54	61	21.97	8.35	34.92	2.26	23.43	40.45	T
May	5	1.58	8,300	173		7.9	51	48	6.83	1.78	8.91	2.08	7.23	8.52	
June	5	5.97	1,300	658		7.9	51	48	25.92	6.78	33.73	7.88	27.32	32.25	.05
July	1	7.11	93,-2	810		7.9	51	48	30.85	8.06	40.26	9.40	32.64	38.46	
Aug.	4	1.86	13,500	212	.24	7.9	62	47	6.12	1.96	13.12	3.25	7.81	10.08	.10
Sept.	4	1.20	8,930	133		7.9	61	50	3.88	1.45	8.26	1.53	5.28	6.85	
Oct.	5	1.72	1,040	190		7.9	61	50	5.53	2.06	11.80	12.50	7.55	9.79	.03
Nov.	3	3.87	2,140	428	.25	7.9	61	50	12.50	4.64	26.59	4.94	16.97	22.05	
Dec.	4	3.59	13,900	397		7.9	61	50	11.56	4.31	24.62	4.57	15.75	20.44	
Mean &	50	2.65	145,183.2	297		7.92	61	54	8.46	3.27	18.58	3.38	10.69	16.42	.035
Period Average	1.92	501,000	217						6.53	2.43	12.93	3.12	7.72	11.12	
Tons of Constituents, 1947									12,600	2,960	31,800	7,670	38,200	43,300	
Average Tons Period 1930-1947									62,900	9,140	58,800	73,200	160,000	28,300	
									62,900	9,480	62,000	71,500	170,000	28,400	

Sampling by Mexican Section

Rio Conchos at Cuchillo Parado

Jan.	14	.87	48,600	92.4	.20	8.0	44	11	4.27	1.18	4.21	3.68	4.94	1.11	.04
Feb.	12	.74	36,600	78.4	.18	7.2	43	13	3.67	1.00	3.48	2.96	4.24	1.03	.03
Mar.	13	.81	26,600	86.9	.20	8.3	42	14	4.11	1.11	3.75	3.08	4.73	1.24	.02
Apr.	13	1.15	9,680	120	.27	7.9	51	23	4.45	1.35	5.98	2.56	6.76	2.81	.05
May	13	1.13	12,100	121	.26	7.9	52	22	4.33	1.37	6.18	2.33	6.95	2.72	.10
June	15	1.04	15,700	110	.26	8.0	49	19	4.43	1.23	5.37	2.47	6.59	2.10	.06
July	13	1.17	13,500	120	.21	7.8	43	17	5.52	1.33	5.26	2.36	7.90	2.12	.03
Aug.	13	.59	83,800	63.0	.10	7.7	35	11	3.38	.62	1.72	2.35	3.20	.70	.14
Sept.	14	.52	95,400	50.2		7.9	34	9	2.77	.59	1.72	2.40	2.29	.45	
Oct.	14	.98	28,400	101	.22	7.9	44	14	4.57	1.22	4.60	3.00	5.88	1.50	.03
Nov.	12	.74	44,600	78.4	.17	7.8	38	10	3.95	1.03	2.99	3.08	4.25	.86	.03
Dec.	14	.81	46,900	83.2	.14	7.8	41	12	3.95	1.04	3.45	3.45	4.23	1.04	.03
Mean &	160	.701	451,880	72.7		7.82	40	12	3.58	.858	2.92	2.74	3.81	.912	.060
Period Average	685	461,000	72.0						3.42	.850	2.94	2.56	3.86	.874	
Tons of Constituents, 1947									62,900	9,140	58,800	73,200	160,000	28,300	
Average Tons Period 1930-1947									62,900	9,480	62,000	71,500	170,000	28,400	

Sampling by U.S. Section

Rio Conchos near Ojinaga, Chihuahua

Jan.	5	.88	49,800	94.3	.22	7.9	46	12	4.13	1.19	4.51	3.82	4.88	1.18	.02
Feb.	4	.78	37,400	84.2	.17	7.9	41	13	4.02	1.07	3.59	3.26	4.35	1.19	.02
Mar.	5	.84	28,300	91.5	.20	8.0	44	18	4.02	1.14	4.11	3.08	4.65	1.67	.01
Apr.	5	1.13	9,040	123	.21	7.9	48	24	5.01	1.44	5.90	3.26	6.39	3.01	.01
May	5	1.05	14,400	109	.20	7.9	43	21	5.09	1.15	4.73	2.71	6.25	2.32	.02
June	5	1.06	13,600	113	.23	8.3	50	23	4.43	1.31	5.71	2.81	6.03	2.70	.03
July	5	1.21	10,800	127	.26	7.6	45	21	5.58	1.49	5.69	2.51	7.78	2.72	.02
Aug.	7	.62	76,300	65.8	.09	7.8	35	9	3.51	.62	2.22	2.59	3.46	.62	.07
Sept.	5	.49	92,100	50.7		7.8	36	12	2.64	.61	1.86	2.33	2.19	.63	.04
Oct.	5	1.05	34,200	109	.27	8.1	46	17	4.58	1.30	5.08	3.06	6.07	1.92	.01
Nov.	5	.74	44,300	80.7	.19	7.8	39	13	3.97	1.04	3.15	3.02	4.25	1.05	.02
Dec.	5	.84	42,300	89.3	.20	8.2	42	13	4.20	1.10	3.78	3.44	4.64	1.20	.03
Mean &	61	.711	452,540	75.2		7.89	41	14	3.63	.890	3.10	2.81	3.85	1.06	.035
Period Average	579	609,000	62.2						3.22	.771	2.41	2.53	3.88	.881	
Tons of Constituents, 1947									63,000	9,370	61,700	74,200	160,000	32,500	
Average Tons Period 1930-1947									62,900	13,400	79,300	110,000	203,000	44,700	

Sampling by U.S. Section

Terlingua Creek

June #	10	1.00	1,230	98.3	.15	8.1	59	3	2.97	.91	5.69	1.76	7.78	.34	
July	10	1.21	1,710	118	.13	7.7	57	12	4.10	1.72	2.85	2.06	4.73	.90	.06
Aug.	5	.66	2,300	66.2	.19	7.8	55	4	2.58	1.48	3.75	2.03	4.57	.25	.07
Sept.	5	1.31	305	132		7.8	55	3	5.12	1.46	7.44	4.01	9.07	.51	
Oct.	4	1.38	218	136	.20	7.7	58	3	4.54	1.39	8.16	1.94	11.93	.38	.07
Nov.	3	1.41	261	140	.12	8.1									

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES 1947**

Month	No. of Samples	Total Tons of Dissolved Solids						Mean K ₂ CO ₃ @ 25°C	Boron p.p.m.	pH	% Na ₂ SO ₄	% Cl ₂ SO ₄	Mean Milligram Equivalents per Liter						
		Per Acre-Foot	Dissolved Solids	Boron p.p.m.	pH	% Na ₂ SO ₄	% Cl ₂ SO ₄						Ca	Mg	Na	CO ₃ ²⁻ + HCO ₃ ⁻	SO ₄	Cl	NO ₃
Sampling by U.S. Section																Rio Grande at Langtry			
Jan.	6	1.14	99,100	128	.22	8.0	53	53	4.24	1.80	6.81	3.03	5.61	4.18	4.18	5.61	5.12	5.12	.05
Feb.	6	1.02	80,300	115	.13	7.9	53	51	3.85	1.63	6.07	2.82	5.12	5.61	5.61	5.12	5.12	.05	
Mar.	5	0.96	65,200	113	.17	7.8	53	34	3.48	1.75	5.89	2.19	5.77	5.77	5.77	5.12	5.12	.05	
Apr.	9	.72	20,500	84.2	.17	7.7	45	26	2.86	1.68	3.76	2.06	4.07	2.16	2.16	2.16	2.16	.05	
May	.65	41,500	76.3	.17	7.7	46	24	2.86	1.06	3.36	1.81	3.74	1.80	1.80	1.80	1.80	.05		
June	.7	.81	28,000	89.8	.17	8.2	48	24	3.11	1.53	4.20	2.29	4.45	2.10	2.10	2.10	2.10	.05	
July	.73	28,100	79.3	.18	7.9	44	17	3.07	1.34	3.50	2.09	4.45	1.38	1.38	1.38	1.38	.05		
Aug.	.8	.78	25,100	75.7	.14	7.8	45	14	3.51	.84	3.23	2.19	4.29	1.05	1.05	1.05	1.05	.10	
Sept.	.7	.50	134,000	56.9	.17	7.7	55	11	3.03	.59	1.98	2.41	2.57	.82	.82	.82	.82	.05	
Oct.	6	.78	51,000	83.1	.16	8.1	59	17	3.88	1.22	3.29	2.66	4.37	1.45	1.45	1.45	1.45	.05	
Nov.	7	.78	52,400	85.6	.17	7.8	40	15	3.94	1.24	3.52	3.00	4.46	1.34	1.34	1.34	1.34	.05	
Dec.	6	.62	60,400	89.4	.19	7.9	43	21	3.80	1.52	3.92	3.92	4.07	1.92	1.92	1.92	1.92	.05	
Mean \bar{x}	80	.753	740,300	83.8		7.85	45	22	3.45	1.14	3.74	2.51	4.06	1.83	1.83	1.83	1.83	.05	
Period Average		.802	957,100	88.8					3.51	1.14	4.14	2.14	4.19	2.22	2.22	2.22	2.22		
Tons of Constituents, 1947									92,500	18,500	115,000	102,000	261,000	86,800					
Average Tons Period 1945-1947									114,000	22,600	154,000	121,000	326,000	128,000					

Month	Sampling by U.S. Section														Pecos River				
	15	4.41	75,400	488	.33	7.8	61	62	10.48	9.34	31.06	2.53	16.61	31.78	.08				
Jan.	15	4.46	58,000	490	.32	8.0	60	62	11.07	9.38	30.90	3.19	16.31	31.57	.04				
Feb.	14	4.72	68,000	527	.31	7.7	62	64	10.58	10.01	33.66	1.75	18.05	34.72	.05				
Mar.	15	4.53	53,000	514	.32	7.7	63	65	9.89	9.73	32.75	1.30	17.36	34.08	.07				
Apr.	15	2.02	87,000	335	.26	8.1	61	62	7.02	5.98	20.36	1.55	11.16	20.80					
May	19	2.99	65,800	339	.18	8.2	61	61	7.02	6.13	20.25	1.70	11.32	20.75	.06				
June	2.85	33,900	331	.24	7.9	61	62	6.49	6.15	19.95	1.55	10.91	20.34	.05					
July	2.22	35,500	321	.23	7.9	61	61	6.68	6.00	19.57	1.89	10.70	19.60	.06					
Aug.	2.50	40,200	284	.24	8.1	59	59	6.54	5.34	16.86	2.47	9.23	16.97	.07					
Sept.	16	2.88	33,100	314	.20	8.1	59	59	7.07	6.02	18.84	2.51	10.49	19.05	.09				
Oct.	15	3.16	37,000	363	.23	7.7	59	60	8.16	7.05	21.68	2.76	12.09	22.20					
Nov.	16	4.01	56,100	451	.30	7.8	59	61	10.09	8.70	27.54	2.94	15.41	28.59	.04				
Mean \bar{x}	191	3.46	644,300	390	.258	7.95	61	62	8.29	7.32	24.02	2.12	13.09	24.59					
Period Average	4.15	1,601,000	436				51	55	13.15	8.19	25.47	2.51	18.57	25.73	.056				
Tons of Constituents, 1947									42,100	22,500	140,000	16,400	159,000	221,000					
Average Tons Period 1945-1947									138,000	52,200	307,000	40,200	467,000	478,000					

Month	Sampling by U.S. Section														Goodenough Spring 1946 (Revised)			
	2	.29	1,620	42.1	1	.05	7.9	20	13	1.49	1.14	.65	2.11	.57	.42			
Feb.	2	.24	1,580	34.8	1	.05	7.9	20	13	1.23	.95	.54	1.75	.48	.35			
Mar.	2	.23	1,380	28.0	1	.05	7.9	22	14	1.19	.84	.56	1.68	.46	.37			
Apr.	2	.23	2,570	37.7	1	.05	7.9	21	14	1.59	1.13	.74	2.25	.61	.50			
May	2	.30	3,270	37.7	1	.05	7.9	21	14	1.59	1.13	.74	2.25	.61	.50			
June	6	.30	3,240	35.6	.02	7.9	14	9	2.43	.73	.52	2.86	.35	.13				
July	9	.29	4,640	33.3	.03	7.9	13	10	2.30	.59	.45	2.63	.39	.11				
Aug.	5	.23	2,990	25.3	.09	7.7	20	13	1.19	.82	.51	1.71	.44	.35				
Sept.	2	.25	2,980	28.8			7.8	16	11	1.53	.96	.48	2.10	.44	.35			
Oct.	5	.35	5,110	42.1			7.9	9	6	3.37	.75	.41	3.68	.41	.35			
Nov.	4	.35	4,380	41.5	.05		7.9	11	9	2.96	.93	.47	3.39	.46	.40			
Dec.	2	.27	3,400	32.8			7.9	15	11	1.94	.97	.51	2.40	.52	.38			
Mean \bar{x}	43	.288	35,970	35.1			7.87	15	11	2.04	.877	.519	2.51	.471	.367	.106		
Period Average		.284	35,850	33.6														
Tons of Constituents, 1946										6,940	1,810	2,030	13,000	3,840	2,210			
Average Tons Period 1946-1947																		

Month	Sampling by Mexican Section														Goodenough Spring 1947			
	3	.30	3,000	30.2		7.8	21	16	1.48	.95	.64	2.00	.50	.19	.11			
Jan.	2	.27	2,980	30.7		7.9	15	11	1.77	.94	.46	2.29	.47	.34	.11			
Feb.	4	.28	3,110	28.6	.04	8.0	19	14	1.21	.97	.55	1.76	.51	.40	.21			
Mar.	4	.21	2,370	24.6	.02	8.1	22	14	1.47	.92	.52	1.35	.48	.32	.10			
Apr.	0	.22	2,590	25.4	.05	8.0	21	14	1.08	.90	.52	1.50	.46	.33	.10			
July	6	.23	2,460	24.4	.05	7.9	20	13	1.18	.90	.52	1.69	.45	.34	.11			
Aug.	2	.34	3,590	34.6		7.9	12	9	2.72	1.08	.54	3.34	.52	.41	.11			
Sept.	2	.27	2,740	34.6		7.9	12	9	2.16	.86	.43	2.69	.41	.33	.11			
Oct.	2	.30	3,000	33.9	.05	7.8	15	10	1.98	.97	.53	2.54	.49	.34	.09			
Nov.	0	.34	3,120	38.1		7.8	18	14	2.20	1.06	.72	2.84	.60	.58	.09			
Dec.	2	.36	3,160	40.2		7.8	19	16	2.31	1.10	.81	2.99	.66	.70	.07			
Mean \bar{x}	4313	.897	41,574,400	102	.158	7.96	48	38	3.48	1.68	4.81	2.35	3.84	3.81	.071			
Period Average		1.12	3,242,000	126			47	40	4.66	1.98	5.99	2.42	5.09	5.03				
Tons of Constituents, 1947									168,000	49,300	267,000	173,000	445,000	326,000				
Average Tons Period 1946-1947									367,000	94,500	542,000	290,000	960,000	702,000				

** Percent of total cation estimated	*** Percent of total anions estimated	† Weighted mean	‡ Total for June and November

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**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES 1947**

Month	No. of Sam- ples	Mean Milligram Equivalents per Liter										
		Total Tons of Dissolved Solids	Mean K ₁₀₅ @25°C	Boron p.p.m.	pH	% Na **	% Cl ***	Ca	Mg	Na	CO ₃ + HCO ₃	SO ₄

Sampling by Mexican Section

Rio Salado															
Jan.	14	3.24	6,220	303	.92	7.8	44	28	11.61	7.82	15.16	1.98	23.06	9.67	.01
Feb.	12	4.17	4,300	386	1.51	7.6	45	28	14.53	10.15	19.94	1.85	30.10	12.65	.01
Mar.	13	5.02	6,980	450	1.56	7.7	45	28	17.17	12.13	24.02	2.03	36.50	15.08	.02
Apr.	14	5.59	4,390	496	1.88	7.7	45	28	19.27	13.33	26.68	2.01	40.67	16.98	.03
May	21	1.20	39,200	126	.39	7.7	41	26	5.14	2.34	5.12	1.91	7.54	3.38	.11
June	24	.44	29,100	48.7	.14	7.8	31	18	2.65	.61	1.44	2.05	1.86	.85	.08
July	14	.76	3,820	82.3	.23	7.8	35	21	3.87	1.42	2.91	2.06	4.54	1.75	.06
Aug.	18	.40	69,000	47.1	.07	7.9	28	18	2.62	.73	1.29	2.01	1.84	.88	.06
Sept.	17	.57	25,500	61.8	.77	37	23	2.90	.92	2.21	1.73	2.93	1.42	.07	
Oct.	14	.67	2,430	72.8	.19	7.7	37	24	3.39	1.14	2.64	1.76	3.71	1.75	.03
Nov.	14	1.12	4,650	121	.35	7.7	37	26	5.08	2.26	4.75	1.58	7.63	3.20	.03
Dec.	13	5.20	6,080	298	.98	7.6	43	27	11.56	7.73	14.54	1.93	23.26	9.10	T
Mean #	4188	.600	4 201,670	65.4		7.82	34	22	3.20	1.11	2.26	1.96	3.24	1.47	.068
Period Average		.918	268,000	96.1			40	27	4.34	1.71	3.99	1.95	5.35		
Tone of Constituents, 1947									29,300	6,170	23,700	27,300	71,100	23,800	
Average Tons Period 1935-1947									31,000	7,430	32,700	21,100	91,600	34,700	

Sampling by Mexican Section

Rio Grande at Roma															
Jan.	30	1.12	196,000	131	.18	7.9	51	41	4.02	2.25	6.65	2.67	4.91	5.37	.04
Feb.	27	1.13	169,000	129	.18	7.9	53	42	3.65	2.20	6.76	2.29	4.99	5.36	.06
Mar.	31	1.14	147,000	134	.20	7.8	53	45	3.68	2.39	6.94	2.06	5.25	5.92	.07
Apr.	30	1.19	99,600	146	.22	7.8	53	47	3.89	2.57	7.14	1.96	5.54	6.66	.09
May	26	.81	208,000	95.3	.26	7.9	48	58	3.26	1.46	4.54	1.97	3.82	5.52	.08
June	30	.52	127,000	61.5	.14	7.9	43	34	2.46	.91	2.56	2.13	3.94	5.00	.08
July	31	.88	89,700	104	.17	8.1	50	40	3.16	1.79	5.02	2.06	3.70	4.22	.03
Aug.	31	.50	241,000	77.0	.11	7.9	41	25	2.48	.72	2.27	1.97	2.20	3.85	.06
Sept.	30	.60	246,650	65.8	.11	7.9	40	22	3.08	.87	2.61	2.28	2.85	4.44	.09
Oct.	31	.67	92,300	74.6	.13	8.0	43	39	3.00	1.13	3.07	2.44	2.78	2.10	.04
Nov.	30	.77	99,500	88.0	.20	7.9	43	30	3.50	1.42	3.77	2.48	3.60	2.68	.06
Dec.	30	.94	124,000	106	.18	7.8	46	34	3.82	1.86	4.84	2.79	4.17	3.58	.03
Mean #	4357	.744	41,912,100	85.8		7.90	47	34	3.10	1.34	3.90	2.21	3.28	2.91	.066
Period Average	#4375	#2,603,240	94.2				48	38	3.35	1.40	4.44	2.20	3.52	3.48	
Tone of Constituents, 1947									217,000	57,000	314,000	236,000	551,000	361,000	
Average Tons Period 1944-1947									276,000	70,600	422,000	278,000	700,000	511,000	

Sampling by U.S. Section

Rio Grande at Rio Grande City															
Jan.	14	1.18	202,000	137	.21	8.0	51	41	4.31	2.25	6.95	2.78	5.16	5.37	.14
Feb.	8	1.11	163,000	130	.22	8.1	55	43	3.55	2.21	6.90	2.15	5.10	5.16	.04
Mar.	12	1.16	153,000	136	.20	8.2	55	46	3.45	2.43	7.13	1.60	5.40	6.07	.03
Apr.	14	1.32	122,000	144	.28	7.9	55	47	3.88	2.35	7.59	2.01	5.42	6.56	.10
May	19	.89	240,000	103	.21	8.1	47	37	3.72	1.60	4.70	2.01	4.31	3.71	.09
June	16	.56	216,000	64.0	.09	8.1	44	31	2.52	.91	2.70	1.86	2.09	2.08	.06
Mean #	4357	.738	41,445,200	84.2		7.87	46	34	3.15	1.27	3.80	2.20	3.21	2.81	.069
Period Average	.735	1,675,000	85.2				47	35	3.14	1.23	3.88	2.19	3.18	2.90	
Tone of Constituents, 1947									170,000	41,500	235,000	180,000	414,000	268,000	
Average Tons Period 1946-1947									195,000	46,200	277,000	207,000	473,000	319,000	

Sampling by U.S. Section

North Floodway near Sebastian, Texas															
January through June	11	3.54	76,400	393	2.11	7.8	60	59	9.19	6.65	24.03	2.93	13.34	23.70	.06
July through December	12	4.27	94,900	469	2.88	7.9	59	59	12.21	8.00	28.98	4.40	15.92	29.18	.11
Mean #	423	3.91	171,300	432	2.50	7.85	60	59	10.72	7.33	26.54	3.68	14.65	26.48	.085
Period Average	1.88	110,000	210				56	54	3.44	2.50	2.50	7.35			

Tone of Constituents, 1947									12,800	5,310	36,300	6,680	41,900	55,900	
Average Tons Period 1941-1947									9,140	3,310	21,700	4,030	28,000	31,900	

** Percent of total cations *** Percent of total anions # Weighted mean 4 Total # Period 1943-1947 T - Trace

ELECTRICAL CONDUCTANCE OF WATER SAMPLES

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El Paso

January	February	March	May	June	July	August	October	November
1 191	10 202	22 104	1 123	10 112	20 119	29 123	7 181	22 193
2 191	11 202	23 107	2 121	11 115	21 119	30 126	8 186	23 192
3 194	12 201	24 100	3 120	12 114	22 127	31 126	9 186	24 193
4 197	13 196	25 96.3	4 115	13 117	23 126	September	10 189	25 193
5 193	14 198	26 100	5 114	14 115	24 125	1 123	13 190	26 193
6 193	15 200	27 101	6 114	15 102	25 128	2 108	14 188	27 192
7 192	16 200	28 99.1	7 114	16 111	26 123	3 112	15 188	28 193
8 187	17 200	29 98.4	8 123	17 112	27 125	4 118	16 187	29 193
9 178	18 199	30 99.7	9 120	18 113	28 120	5 121	17 185	30 194
10 185	19 201	31 99.4	10 109	19 107	29 120	6 119	20 190	December
11 191	20 201	April 11	11 116	20 105	30 121	7 116	21 188	1 192
12 193	21 200	1 104	12 123	21 118	31 121	8 126	22 189	2 194
13 192	22 202	2 98.1	13 131	22 129	August	9 126	23 190	3 189
14 194	23 201	3 100	14 131	23 125	1 126	10 122	24 188	4 188
15 196	24 202	4 110	15 133	24 125	2 123	11 130	27 190	5 193
16 196	25 201	5 112	16 135	25 122	3 125	12 136	28 188	6 196
17 195	26 183	6 102	17 131	26 126	4 119	13 136	29 190	7 195
18 196	27 129	7 102	18 127	27 122	5 112	14 118	30 190	8 196
19 196	28 131	8 104	19 128	28 121	6 119	15 135	31 190	9 195
20 193	March 9	103	20 123	29 122	7 119	16 151	November	10 197
21 192	1 147	10 103	21 117	30 115	8 121	17 157	1 190	11 196
22 193	2 124	11 108	22 120	July 9	125 18	156 2	191 12	196 196
23 193	3 130	12 110	23 120	1 112	10 124	19 166	3 192	13 197
24 194	4 122	13 111	24 123	2 118	11 124	20 173	4 193	14 196
25 195	5 142	14 102	25 121	3 124	12 123	21 170	5 193	15 198
26 197	6 156	15 109	26 122	4 124	13 126	22 180	6 189	16 196
27 196	7 167	16 112	27 123	5 117	14 126	23 179	7 194	17 198
28 197	8 160	17 110	28 124	6 114	15 122	24 177	8 196	18 197
29 201	9 166	18 109	29 129	7 112	16 120	25 177	9 191	19 197
30 204	10 170	19 106	30 131	8 113	17 108	26 184	10 194	22 196
31 201	11 173	20 116	31 130	9 117	18 111	27 184	11 188	23 196
February	12 177	21 117	June 10	113	19 103	28 176	12 192	24 196
1 202	13 182	22 120	1 132	11 112	20 116	29 186	13 194	26 196
2 201	14 182	23 118	2 127	12 113	21 114	30 178	14 188	27 195
3 200	15 184	24 123	3 117	13 116	22 121	October 1	15 192	30 196
4 200	16 184	25 123	4 115	14 115	23 124	1 184	16 193	31 192
5 201	17 180	26 117	5 117	15 119	24 100	2 187	17 189	
6 200	18 173	27 110	6 122	16 113	25 106	3 187	18 187	
7 199	19 108	28 112	7 115	17 115	26 126	4 187	19 190	
8 201	20 99.8	29 119	8 115	18 118	27 122	5 188	20 194	
9 203	21 105	30 119	9 108	19 122	28 121	6 177	21 193	

Fort Quitman

January	February	March	May	June	July	September	October	November
3 336	12 347	26 492	3 568	18 483	30 712	3 527	15 228	19 384
7 335	19 351	29 540	7 645	21 270	August 10	386 18	450 22	407
8 324	28 389	April 14	301 25	502 6	781 13	585 22	419 15	359
15 329	March 2	542 21	578 July	13 776	17 388	25 508	31 451	December 3 388
21 339	4 395	9 513	28 665	2 716	18 198	24 508	31 451	3 388
22 327	5 344	16 404	31 591	5 731	19 163	27 604	November 5 441	10 392
29 349	12 430	19 426	June 9	769 22	321 October	5 441	17 592	
February	15 514	23 556	4 622	16 758	27 289	1 593	8 436	23 420
5 340	19 483	30 432	11 609	23 764	29 335	8 528	12 415	27 435

Upper Presidio

January	February	March	April	May	June	August	October	November
4 332	1 350	1 383	19 641	24 408	30 639	30 192	4 509	22 452
11 346	8 375	15 455	26 651	31 550	July 19	September 11	560 29	409
18 332	15 366	21 520	30 647	June 19	824 6	301 18	164 December	
25 347	22 374	29 564	May 7	614 14	658 22	229 20	315 25	388 6
30 353	27 380	April 5	610 10	83.4 21	717 23	212 27	428 20	398 15
		12 622	17 254	28 721	28 212		626 15	408 27

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Rio Conchos at Cuchillo Parado

January	February	March	May	June	July	September	October	November
1 101	12 75.6	26 88.8	5 124	16 125	23 134	1 34.0	10 106	21 72.0
3 102	14 74.3	28 97.0	7 151	16 132	25 125	3 37.6	13 105	24 69.4
6 91.3	17 73.2	31 115	9 127	18 84.7	28 124	5 44.9	15 106	26 67.9
8 97.9	19 79.2	April 12	100 18	104 30	133 133	8 60.2	17 107	28 69.7
10 91.0	21 76.3	2 114	14 107	20 116	August 9	1 51.9	20 113	December
13 97.8	24 79.8	4 104	16 115	23 81.9	1 124	10 42.5	22 113	1 72.5
15 88.3	26 80.4	7 112	19 115	25 83.7	4 126	12 55.3	24 112	3 68.3
17 88.0	28 74.6	9 117	21 131	27 97.3	6 114	15 43.8	27 103	5 77.1
20 87.8	March 11	11 118	23 123	30 114	8 122	17 47.1	29 102	8 80.1
22 106	3 91.0	14 112	26 123	July 11	88.7	19 45.3	31 101	10 76.8
24 90.0	5 94.2	16 121	28 126	2 98.6	13 65.3	22 56.0	November	12 88.5
27 89.7	7 86.3	18 137	30 131	4 118	15 74.8	24 57.6	3 102	15 90.0
29 82.6	10 84.9	21 121	June 7	120 120	18 110	26 66.2	5 89.7	17 90.2
31 86.1	12 89.3	23 127	2 144	9 140	20 76.8	29 84.7	7 89.9	19 90.7
February 14	84.0	25 128	4 139	11 132	21 57.1	October 10	86.5	22 85.2
3 88.1	17 81.7	28 128	6 140	14 92.9	25 54.0	1 81.2	12 73.3	24 85.0
5 77.9	19 78.0	30 129	9 138	16 110	27 55.6	3 84.9	14 77.2	26 84.5
7 71.4	21 79.1	May 11	138 18	124 29	46.8	6 108	17 71.6	29 94.3
10 86.5	24 88.3	2 117	13 138	21 106	8 95.0	19 72.1	31 94.1	

Rio Conchos at Ojinaga, Chihuahua

January	February	April	May	June	August	September	October	November
5 108	16 77.7	6 120	19 115	30 99.6	1 132	1 35.0	19 109	30 66.0
13 97.6	27 88.1	13 122	25 125	July 10	97.8	6 48.6	27 109	December
20 89.9	March 15	123	31 126	2 111	55.7	15 37.3	30 106	1 71.3
25 88.5	3 82.0	20 123	June 8	129 129	22 74.7	23 58.6	November 7	80.3
27 88.8	10 91.0	27 125	1 125	15 131	22 75.4	30 82.8	2 101	17 94.6
February 17	91.5	May 9	134	21 118	28 86.5	October 12	78.3	24 91.3
2 87.9	24 90.3	4 125	16 134	28 138	28 47.6	7 96.0	16 76.2	31 102
10 80.8	31 101	12 86.1	25 85.3			13 110	24 70.1	

Terlingua Creek

April	June	June	July	July	August	September	October	December
17 142	3 88.3	21 95.3	3 91.3	22 152	16 39.7	15 121	16 136	4 140
24 142	5 141	21 99.3	8 142	28 148	22 103	20 134	27 135	15 140
May 13	145	27 97.7	8 143	28 142	28 91.4	26 136	November 3 137	24 141
2 136	13 144	27 97.6	16 117	4 142	4 133	2 125	11 140	
22 116	17 144	July 16	117	4 142	4 133	10 135	24 141	
29 145	17 143	3 87.5	22 141	10 140	8 137	10 135		

Johnson Ranch

April	June	June	July	August	September	October	November	December
16 154	2 176	26 92.1	15 52.7	2 113	1 41.9	1 80.1	1 113	1 87.3
25 165	14 168	26 90.3	21 138	8 145	7 46.4	8 98.3	7 105	13 102
May 14	169	July 21	139	14 104	10 59.2	18 89.0	13 90.9	26 120
1 159	16 168	2 102	27 108	20 93.8	14 75.6	25 114	22 79.1	
21 114	20 169	7 120	27 108	26 65.4	19 54.3			
	20 170	15 52.3		30 41.9	25 60.9			

Boquillas

April	April	April	May	May	May	May	May	May
14 128	21 140	29 146	3 132	6 120	19 132	23 116	26 120	28 126

Spring on Mexican Side 50 Ft. Below Boquillas

April	April	April						
14 81.5	21 80.3	29 94.1						

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Maravillas

April	April	April	May						
12	24	30	4	7	20	24	27	30	31
129	137	145	135	138	137	118	117	121	130

Jones Ranch

April 18	April 113	April 22	April 107	April 24	April 112	April 28	April 112	May 4	May 80.2	May 7	May 107	May 10	May 96.0	May 30	May 104	June 12	June 128
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Spring on The United States Side 700 Ft. Below Jones Ranch

April 18	April 22	April 24	April 28	May 4	May 7	May 10	May 30	June 12
79.4	79.7	76.6	79.2	80.0	78.8	80.8	81.4	80.7

Aqua Verde

April	May	June	July	July	July	July	August	August
25 98.7	20 101	2 85.8	21 74.6	7 91.0	19 77.6	25 76.3	1 98.8	11 78.2
30 97.4	26 89.1	4 85.0	23 100	9 99.6	21 97.0	28 83.1	4 88.1	13 85.1
	May 28 85.7	6 80.9	July 11 109	23 95.1	30 84.5			
6 90.7	30 87.1	10 94.6	1 84.1	15 82.8			6 79.0	15 86.9
9 89.9		17 105	4 83.6				8 72.6	

Langtry

January	February	April	May	June	July	August	October	November
5 148	18 116	1 87.9	2 79.2	9 85.0	22 81.0	30 52.6	3 66.6	9 96.9
7 139	19 114	2 83.4	7 80.9	15 89.0	31 79.3	September	5 70.3	17 92.2
12 126	26 103	9 85.4	11 31.6	17 70.9	August	2 52.8	16 82.9	19 87.6
19 124	March	11 90.8	18 110	25 100	6 90.9	9 46.3	21 98.8	December
20 125	3 114	16 87.5	20 89.4	30 115	12 66.7	10 45.8	22 93.3	2 79.2
26 127	12 115	17 89.4	28 84.5	July	19 80.0	12 64.3	27 91.2	7 80.1
February	16 112	23 86.2	29 85.1	2 97.1	19 84.5	18 57.3	November	15 86.2
3 120	21 115	24 86.7	June	7 60.8	26 92.5	21 51.4	3 51.1	16 90.1
4 116	26 114	25 86.1	2 73.9	16 82.8	26 92.3	30 65.2	4 66.5	22 98.9
11 134			6 74.9	18 82.5	27 70.6		6 91.3	30 104

Pecos River near Comstock

January	February	April	May	June	July	September	October	November
1 458	16 485	1 571	13 508	18 434	28 330	2 457	14 328	23 395
3 449	18 494	3 537	14 223	20 490	30 332	4 528	16 320	25 320
5 458	20 494	5 551	15 128	22 457	August	6 337	18 326	27 404
7 471	22 506	7 515	17 296	24 463	1 312	8 407	20 328	29 329
9 488	24 492	9 501	19 424	25 504	3 332	10 351	22 325	December
11 482	26 508	11 524	20 82.7	25 577	5 280	12 294	24 324	1 391
13 518	28 512	13 531	21 356	26 278	7 295	13 132	26 325	3 428
15 535	March	15 522	23 309	28 143	9 332	14 181	28 335	5 432
17 509	2 511	17 501	25 470	30 212	11 326	16 101	30 331	7 385
21 486	4 525	19 503	27 516	July	13 331	18 253	November	9 433
23 501	6 493	21 488	29 483	2 314	15 346	20 291	1 333	11 456
25 511	8 471	23 490	31 344	4 396	17 344	22 285	3 338	13 456
27 505	10 517	25 503	June	6 407	19 366	24 289	5 342	15 451
29 503	12 485	27 486	2 302	8 364	21 345	26 286	7 350	17 445
31 491	14 398	29 490	4 312	10 337	23 360	28 292	9 352	19 477
February	16 539	May	6 364	12 301	25 316	30 293	11 348	21 477
2 487	18 573	1 492	8 369	14 303	26 328	October	13 350	23 477
4 500	20 568	3 479	10 369	16 295	27 236	2 297	15 356	25 490
6 490	22 587	5 455	12 331	18 297	29 306	4 302	17 371	27 477
8 490	24 584	7 481	13 238	20 301	31 338	6 304	19 359	29 494
10 492	26 558	9 469	13 84.5	22 324		8 289	21 346	31 494
12 490	28 573	11 305	14 237	24 332		10 309		
14 477	30 565	12 81.8	16 368	26 337		12 320		

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Goodenough Spring

January 24 39.4	February 14 33.4	March 28 28.2	April 14 31.0	May 9 26.0	July 8 26.7	July 22 27.1	August 25 41.1	October 15 35.1
24 38.9	14 34.3	28 36.7	14 29.9	9 24.8	8 33.6	22 27.7	September 28 45.6	
31 41.4	March 28 36.6	23 37.9	23 35.1	17 26.5	August 23 34.4		December 23 34.9	22 47.0

Eagle Pass

January 3 144	February 11 128	March 26 145	May 9 128	June 21 58.9	August 5 81.5	September 14 63.2	October 28 94.1	December 1 99.3
4 143	12 149	28 147	10 120	24 73.2	6 88.2	16 65.9	29 94.2	2 98.1
5 141	13 147	29 144	12 75.1	24 81.9	7 92.1	17 65.5	30 94.9	3 98.1
6 148	14 148	30 146	12 74.9	25 44.6	8 88.3	18 66.3	31 95.7	4 97.3
7 145	15 149	31 144	13 127	25 74.2	9 80.5	19 64.4		5 102
8 145	16 147	April 1 138	13 129	26 57.0	10 75.1	20 65.2	1 97.5	6 103
9 140	17 146	18 138	15 186	27 289	11 74.3	21 64.7	2 95.3	7 106
11 142	18 137	3 129	16 189	28 296	12 63.3	22 67.5	3 95.6	8 106
13 144	19 138	4 128	18 90.8	29 103	13 75.4	23 66.7	4 88.6	9 106
14 134	20 133	6 129	19 87.9	30 95.7	14 65.1	24 67.9	5 89.2	10 108
15 136	21 133	7 130	20 115	July 15 74.1	15 74.1	25 69.0	6 89.0	11 106
16 136	22 132	8 129	21 125	4 100	16 74.1	26 68.2	7 102	12 106
17 139	23 131	9 128	22 236	5 101	17 72.3	27 64.6	8 103	13 106
18 138	24 131	10 128	26 128	7 98.9	18 73.4	29 72.3	9 101	14 110
19 127	27 140	11 128	27 127	8 99.2	19 99.6	30 72.3	10 97.4	15 111
20 127	28 140	14 139	28 121	9 104	20 106	October 1 71.8	11 96.8	16 112
21 135	March 15 136	29 115	10 100	23 77.8	1 72.4	12 97.2	17 110	
22 130	1 140	16 137	30 128	11 105	45.8	13 103	18 112	
23 132	2 141	17 134	31 129	12 102	25 65.9	3 79.8	14 102	19 112
24 129	3 140	18 134	June 13 110	26 64.4	4 72.3	15 104	20 114	
25 140	4 148	19 132	1 141	14 98.4	27 65.6	6 75.7	16 104	21 116
26 138	6 127	21 132	2 138	15 108	28 71.1	7 75.2	17 104	22 118
27 133	7 125	22 135	3 137	16 102	29 71.9	8 76.4	19 101	23 120
28 135	8 126	23 135	4 118	21 79.6	30 67.7	9 75.7	20 106	24 121
29 135	9 144	25 108	5 115	22 78.7	September 10 76.0	21 105	25 124	
30 135	10 144	26 117	6 103	23 103	1 66.9	11 86.0	22 102	26 123
31 128	11 128	27 123	7 105	24 103	2 65.4	13 86.7	23 100	27 124
February 12 129	28 123	8 103	25 100	3 59.4	14 89.4	24 101	28 128	
1 125	14 146	29 122	9 102	4 59.1	15 86.2	25 100	29 128	
2 138	15 152	30 122	10 104	5 60.4	16 91.9	26 101	30 127	
3 129	16 152	May 11 105	28 101	6 61.7	17 88.9	27 99.6		
4 128	17 144	1 116	14 124	8 56.5	18 87.4	28 99.5		
5 126	18 140	2 130	15 126	9 58.8	20 87.6	29 98.2		
6 128	19 140	3 125	16 80.8	10 73.6	22 91.1	30 100		
7 128	23 139	4 130	17 91.0	11 72.0	25 94.7			
9 127	24 136	5 133	19 35.1	12 62.6	26 97.2			
10 127	25 144	6 129	20 58.6	4 69.9	13 62.7	27 97.3		

Rio Salado

January 1 198	February 21 418	April 9 484	May 20 40.4	June 20 50.6	July 25 170	September 1 144	October 10 48.8	November 30 196
3 218	24 421	11 493	21 98.3	21 36.8	28 187	3 178	13 69.3	December
6 236	26 421	14 499	22 99.4	21 37.5	31 181	5 149	15 87.9	1 226
8 255	28 421	16 505	23 86.2	23 43.9	August 8 154	17 103	3 253	
10 284	March 18 509	24 62.7	23 66.7	1 220	10 151	20 111	8 249	
13 336	1 421	21 518	25 39.1	2 52.7	12 147	22 117	10 242	
15 328	3 424	23 531	26 45.4	25 40.5	3 67.0	13 39.4	24 133	12 250
17 325	5 424	25 531	30 49.9	26 34.6	4 42.6	14 61.5	27 142	15 305
20 334	8 433	28 537	31 49.6	26 36.0	5 31.5	15 95.7	29 142	17 344
22 355	10 436	30 535	June 27 43.0	7 29.6	17 137			
24 350	12 440	May 1 54.6	30 46.3	7 33.6	19 117	November 1 162	22 320	
27 355	14 464	1 535	2 52.9	8 37.2	22 44.8	3 202	24 326	
29 356	17 466	2 540	4 54.4	1 49.1	11 43.8	5 218	26 331	
31 356	19 464	3 577	6 55.9	2 51.0	13 54.0	4 47.7	28 362	
February 21 463	5 379	9 57.3	4 51.8	15 65.7	26 34.6	10 230	29 330	
1 356	24 458	7 259	11 57.2	7 52.1	18 96.8	29 50.9	12 229	
3 353	26 454	9 169	13 56.5	9 59.0	20 100	30 52.0	14 223	
5 355	31 464	12 67.5	15 66.8	11 59.0	22 109	October 17 83.8		
7 355	April 13 101	16 65.6	14 51.5	25 152	1 54.4	19 143		
10 360	1 463	18 108	18 64.6	16 52.5	27 167	3 55.6	21 74.4	
12 368	2 470	16 58.4	19 76.7	18 54.1	30 156	5 43.9	24 81.9	
17 400	4 471	19 63.0	19 84.4	21 63.1	31 155	6 34.0	26 92.0	
19 414	7 480	20 54.9	20 52.6	23 140	8 37.8	28 144		

ELECTRICAL CONDUCTANCE OF WATER SAMPLES

1947

Date	Kx10 ⁵ @25°C												
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Roma

January	February	March	May	June	July	September	October	November
1 129	12 128	24 137	1 136	16 101	25 110	2 77.6	12 79.0	21 85.2
2 120	13 132	25 129	2 125	17 126	26 110	3 75.6	13 74.9	22 93.9
3 121	14 130	26 152	3 134	18 91.7	27 109	4 76.8	14 77.0	23 96.8
4 120	15 136	27 147	4 131	19 74.2	28 108	5 74.1	15 76.6	24 104
5 126	16 131	28 140	6 246	20 88.4	29 108	6 68.6	16 76.4	25 103
6 127	17 127	29 144	7 212	21 67.6	30 102	7 75.9	17 77.3	26 103
7 124	18 126	30 132	8 152	22 60.5	31 85.5	8 76.5	18 80.5	27 85.9
8 129	19 129	31 140	9 139	23 50.2	August	9 69.6	19 44.7	28 95.6
10 131	20 127	April	10 144	24 40.5	1 71.3	10 64.0	20 62.7	29 99.5
11 128	21 129	1 143	11 144	25 43.0	2 53.5	11 62.4	21 74.0	30 102
12 128	22 130	2 130	12 135	25 43.0	3 62.7	12 62.6	22 80.6	December
13 130	23 130	3 146	13 74.2	26 35.9	4 54.4	13 64.1	23 80.4	1 103
14 131	24 134	4 145	14 91.6	27 36.5	5 42.6	14 48.6	24 84.6	2 101
15 131	25 139	5 153	18 94.0	28 50.3	6 37.0	15 61.0	25 87.8	3 99.6
16 128	26 135	6 155	19 137	29 54.6	7 36.0	16 53.6	26 87.9	4 99.4
17 131	27 128	7 153	20 57.4	30 43.9	8 38.5	17 43.0	27 88.7	5 98.8
18 134	28 135	8 157	21 104	July	9 42.6	18 54.9	28 92.2	6 99.1
19 141	March	9 153	22 84.6	1 42.0	10 49.0	19 83.6	29 91.7	7 98.5
20 140	1 132	10 153	23 80.1	2 48.1	11 52.7	20 73.2	30 93.0	8 98.0
21 140	2 127	11 153	24 77.7	3 60.2	12 59.4	21 66.9	31 92.5	9 98.2
22 141	3 137	12 152	25 73.1	4 58.7	13 58.1	22 67.4	November	10 96.4
23 138	4 129	13 147	26 69.9	5 76.9	14 57.8	23 58.6	1 65.4	11 97.1
24 135	5 128	14 151	27 59.9	6 133	15 64.2	24 57.0	2 70.0	12 97.6
25 138	6 131	15 150	28 75.4	7 231	16 70.9	25 75.3	3 61.7	13 99.4
26 135	7 130	16 147	29 63.3	8 217	17 76.3	26 67.8	4 72.2	14 98.0
27 131	8 132	17 125	30 46.5	9 120	18 84.2	27 62.4	5 71.7	15 100
28 129	9 132	18 94.1	June	10 106	19 93.9	28 61.5	6 80.9	16 100
29 131	10 130	19 101	1 152	11 119	20 94.6	29 60.4	7 91.5	17 104
30 135	11 133	20 137	2 200	12 104	21 92.7	30 59.6	8 94.1	18 104
31 131	12 133	21 144	4 110	13 95.4	22 77.4	October	9 92.6	19 107
February	13 130	22 145	5 87.2	14 95.7	23 63.7	1 67.8	10 93.8	20 107
1 128	14 134	23 145	6 104	15 94.0	24 47.9	2 68.7	11 97.3	21 107
2 130	15 130	24 145	7 132	16 92.2	25 65.1	3 68.7	12 101	23 107
4 127	16 130	25 144	8 139	17 105	26 74.2	4 69.2	13 102	24 110
5 129	17 140	26 149	9 129	18 111	27 94.0	5 67.7	14 93.9	25 110
6 133	18 139	27 150	10 130	19 106	28 76.9	6 69.3	15 102	26 110
7 131	19 139	28 142	11 130	20 102	29 86.0	7 67.9	16 103	27 113
8 135	20 142	29 142	12 136	21 104	30 78.2	8 68.4	17 96.4	28 113
9 128	21 142	30 141	13 141	22 113	31 68.4	9 69.9	18 86.0	29 113
10 129	22 148	14 152	23 111	September	10 70.0	19 78.1	30 116	
11 129	23 138	15 63.9	24 111	1 76.8	11 71.9	20 82.0	31 117	

Rio Grande City

January	January	February	March	April	April	May	May	June
1 144	24 140	14 134	17 137	7 161	28 149	13 83.5	27 57.7	18 132
4 124	27 140	17 132	20 146	9 160	30 144	14 133	29 74.1	21 80.5
6 132	29 140	19 131	21 152	11 159	May	14 91.4	June	21 67.4
8 131	31 139	21 131	24 148	13 80.6	2 144	16 68.4	2 157	22 62.6
10 131	February	March	26 149	14 150	5 254	19 132	4 161	23 70.8
13 135	3 139	6 132	28 151	16 148	7 244	20 57.5	6 95.0	25 46.3
15 137	5 138	8 155	31 139	18 146	9 169	21 87.8	9 142	25 32.9
17 136	8 130	10 138	April	21 123	12 125	24 77.3	11 140	26 40.0
20 146	10 131	12 132	2 140	23 149	13 124	26 72.3	13 142	30 43.1
22 142	12 131	14 135	4 141	25 153	13 82.7	26 62.5	16 83.4	

ELECTRICAL CONDUCTANCE OF WATER SAMPLES

1947

Date	Kx10 ⁵ @25°C												
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Mercedes

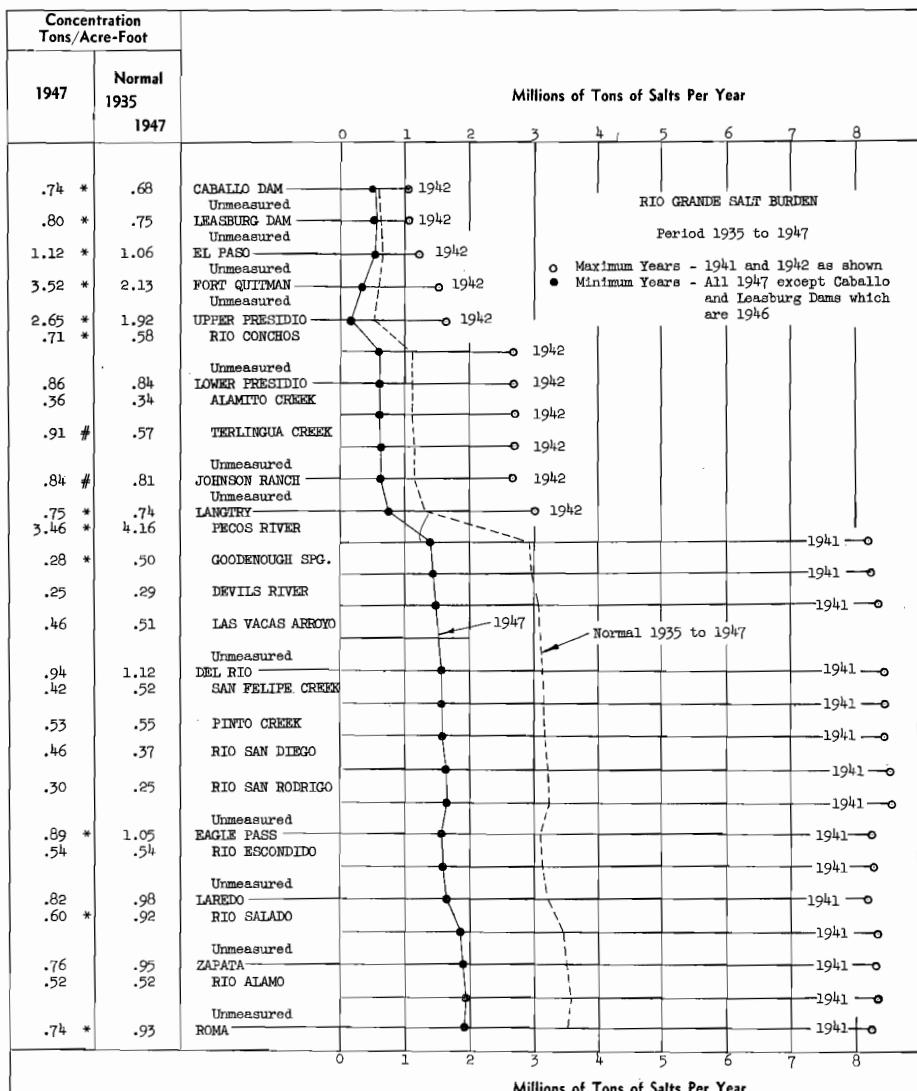
January	February	March	April	May	June	July	August	September	October	November	December
1 128	10 134	21 128	1 122	10 166	19 108	1 73.8	1 70.4	23 90.5			
2 124	11 135	22 130	2 121	11 138	21 95.3	2 75.8	15 71.8	24 82.5			
3 131	12 132	23 136	3 124	12 123	22 95.1	3 68.9	16 73.5	25 83.9			
4 139	13 135	24 141	4 125	13 115	23 95.2	4 79.8	17 75.8	27 96.5			
5 143	14 130	25 144	5 126	14 104	24 96.4	6 79.9	18 76.4	28 111			
6 137	15 130	26 147	6 140	15 129	27 101	8 78.1	20 79.8	29 103			
7 123	16 130	27 149	7 135	16 132	28 113	9 71.8	21 80.2	30 82.6			
8 123	17 130	28 143	8 139	17 131	29 108	10 67.4	22 85.9				
9 121	18 132	29 144	9 138	18 123	30 109	11 78.9	23 64.1	1 75.2			
10 123	19 131	30 143	10 137	19 126	31 112	12 73.7	24 50.9	2 89.2			
11 124	20 132	31 151	11 127	20 105				3 97.9			
12 124	21 132		12 251	21 111	1 111	14 65.0	26 72.0	4 101			
13 126	22 130	1 143	13 230	22 81.1	2 102	15 64.0	27 81.1	5 99.3			
14 129	23 129	2 139	14 217	23 72.8	3 63.1	16 68.8	28 84.7	6 104			
15 131	24 129	3 135	15 134	24 61.4	4 57.5	17 58.8	29 85.7	7 104			
16 136	25 129	4 129	16 96.0	25 60.0	6 49.6	18 61.7	30 87.5	8 102			
17 131	26 131	5 134	17 122	26 69.4	7 13.4	19 55.6	31 89.8	9 102			
18 132	27 131	6 136	18 88.9	27 42.5	8 37.1	20 47.4					
19 131	28 135	7 142	19 58.8	28 40.1	9 15.6	21 55.4	1 93.1	11 101			
20 131	March	8 138	20 79.3	29 37.7	10 10.4	22 80.2	2 95.1	12 114			
21 130	1 133	9 135	21 91.6	30 42.5	11 11.8	23 62.7	3 96.3	13 102			
22 130	2 136	10 142	22 126	July	12 13.6	24 68.1	4 91.6	14 101			
23 136	3 127	11 148	23 66.2	1 47.3	13 47.7	25 60.9	6 79.5	15 99.3			
24 140	4 125	12 151	24 78.0	2 52.0	14 52.1	26 59.7	7 74.0	16 102			
25 141	5 129	14 153	25 88.5	3 49.9	15 55.5	28 61.9	8 76.3	17 101			
26 141	6 128	15 156	26 84.4	4 55.3	17 60.0	29 71.9	9 72.7	18 103			
27 137	7 126	16 151	27 82.1	5 47.6	18 59.5	30 67.5	10 76.8	20 105			
28 133	8 130	17 91.0	28 68.0	6 45.5	19 59.5	October	11 73.9	21 109			
29 135	9 128	18 124	29 67.8	7 46.5	20 68.1	1 67.3	12 87.9	22 109			
30 136	10 128	19 144	31 60.4	8 53.9	21 67.9	3 64.9	13 96.1	23 108			
31 135	11 129	20 144	June	9 62.7	22 72.3	4 64.2	14 96.9	24 110			
February	12 128	21 141	1 71.4	10 61.9	23 73.4	5 64.2	15 97.1	25 111			
1 130	13 130	22 152	2 76.8	11 58.3	24 77.8	6 67.4	16 94.9	26 111			
2 131	14 132	23 149	3 73.2	12 81.4	25 75.5	7 71.6	17 100	27 112			
4 134	15 130	25 159	4 61.5	13 133	26 73.3	8 72.5	18 105	28 111			
5 135	16 131	26 122	5 56.1	14 193	27 61.5	9 76.3	19 105	29 111			
6 135	17 131	27 129	6 68.6	15 173	28 52.2	10 71.4	20 93.8	30 114			
7 134	18 133	28 143	7 116	16 122	29 73.5	11 71.7	21 96.4	31 114			
8 136	19 130	29 129	8 174	17 99.9	31 86.9	12 69.2	22 81.9				
9 135	20 130	30 128	9 178	18 106		13 69.2					

North Floodway near Sebastian, Texas

January	March	April	June	July	September	October	November	December
14 377	5 406	21 453	4 611	28 473	5 467	9 408	6 405	8 474
27 389	24 377	May	17 484	August	29 411	28 377	24 332	22 552
February	April	6 447	July	14 510				
24 353	10 468	20 125	11 423	29 614				

RIO GRANDE SALT BURDEN

The term "salt" as used herein means total dissolved solids. The graphical and tabular results below for stations marked by the symbol * are based upon the chemical analyses shown on the preceding pages of this bulletin as well as upon similar data in previous bulletins. For some tributaries not asterisked the results are based upon curves showing the approximate relationship between salt concentration and quantity of stream flow. For other stations and stream contributions, the results have necessarily been estimated.



Based on analysis of water samples from June through December

SANITARY ASPECTS OF WATER QUALITY

The United States and Mexican Sections of this Commission, the Federal Department of Public Health of Mexico, and the Texas State Department of Health co-operate in a 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, and the Cameron County Health Unit. Analyses for Biological Oxygen Demand (B.O.D.) and for Dissolved Oxygen (D.O.) were made for only a part of the samples.

The records published since 1932 for Nuevo Laredo, since 1942 for Laredo, and since 1937 for El Paso show that the monthly average coliform density in Rio Grande water at the sampling stations correlates quite well with surface washings of the tributary watershed as indicated by surface inflow to the river. A high coliform density was found in the storm flow of three tributary arroyos draining normally dry desert areas, some with no human habitation. These facts indicate that proportionately large coliform contaminations in the Rio Grande came from surface wash within the watershed, even from uninhabited desert areas. These facts also indicate that coliform concentrations in the Rio Grande do not reliably show sewage contamination.

Date 1947	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)	Date 1947	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)
FRANKLIN CANAL AT WATER PLANT									
Jan. 3	72.9	2.3	26		July 21	86.5	1.7	5,500	
Feb. 7	88.5	2.8	11,000		24			1,100	
14		2.1	6,200		28			3,600	
21		1.8	1,100		31	81.4	1.7	2,300	
28	80.7	2.1			7	88.1	1.7	3,600	
Mar. 6	79.8	1.6	2,100		14	73.8	2.4	2,300	
13	89.7	2.4	540		18			22,000	
19		3.8	5,200		21	40.7	.9	2,300	
24			16,000		25			24,000	
27	81.8	2.7	2,300		28	41.5	1.0	6,200	
31	82.6	2.2	6,200		Sept. 4	38.2	.6	6,200	
April 3		1.7	16,000		8			24,000	
8			620		11	65.9	2.8	6,200	
10	80.7	1.5	38,000		16			1,100	
17	81.7	1.6	2,300		18	99.0	3.1	16,000	
21			3,600		23			5,500	
24	89.7	1.3	1,600		25	101	1.5	3,600	
May 1	86.9	1.7	3,600		Oct. 2	88.6	.9	11,000	10,450
5			3,600		6			5,500	
8	87.0	2.6	360		9	91.8	1.3	3,600	7,400
13			2,600		16	97.1	1.0	3,600	23,400
15	85.2	1.4	2,300		23			9,400	31,700
22	86.2	1.6	2,300		30	1.1	2,300	15,700	
26			16,000		Nov. 6	85.6	1.6	1,100	
29	86.7	1.3	360		13	81.4	2.1	11,000	
June 5	84.1	1.8	1,600		20	89.8	1.6	3,600	9,600
9			2,300		26	80.9	1.7	6,200	7,000
12	84.7	.8	930		Dec. 4	103	3.3	9,400	35,400
19	80.0	1.9	5,500		11	92.1	1.8	340	11,500
26	85.9	1.1	1,200		18			2,300	2,650
July 3		.8	2,300		24			540	
10	83.9	1.9	23,000		Total Average	3,290.9	87.7	390,016	167,500
14			2,300			82.3	1.8	6,090	14,000
17	87.8	1.3	1,600						

SANITARY ASPECTS OF WATER QUALITY

Date 1947	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.	Total Bacteria per c. c. (plate count)	Date 1947	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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RIO GRANDE AT YSLETA-ZARAGOZA BRIDGE

Jan. 2	57.1	8.7	160,000		July 10	69.4	3.4	2,100,000	
9	65.7	7.5	940,000		17	66.9	19.0	1,100,000	
16	61.7	9.0	940,000		24	66.9	1.9	620,000	
23	53.8	12.0	1,100,000		31	68.0	3.4	620,000	
30	56.1	18.6	7,000,000		Aug. 7	69.4	2.9	110,000	
Feb. 6	45.0	3.0	1,100,000		14		4.0	2,300,000	
13	45.2	16.3			21	32.2	.4	280,000	
20	59.1	10.5	2,400,000		28	33.5	1.7	6,200,000	
27	53.0	13.0	360,000		Sept. 4	31.0	2.1	2,300,000	
Mar. 6	55.2	17.0	670,000		11	72.7	5.4	1,100,000	
13	8.3	58.0	7,000,000		18	78.8	5.0	550,000	
20	16.7	6.9	620,000		25	0	55.0	24,000,000	
27	70.4	5.2	110,000		Oct. 2	65.4	5.0	620,000	13,933,000
April 3	72.4	5.0	360,000		9	71.9	2.9	2,300,000	9,750,000
10	76.2	4.9	360,000		16	69.1	1.6	230,000	13,900,000
17	78.1	5.1	36,000		23	0	45.0	38,000,000	75,500,000
24	74.4	5.4	360,000		30			11,000,000	1,750,000
May 1	65.4	4.4	620,000		Nov. 6	17.0	36.0	38,000,000	22,000,000
8	59.8	4.9	360,000		13	62.7	8.8	1,100,000	6,600,000
15	71.3	4.7	940,000		20	24.6	9.4	1,600,000	600,000
22	70.1	6.4	230,000		26	65.6	22.7	9,400,000	
29	77.9	2.6	62,000		Dec. 4	67.1	23.0	24,000,000	2,700,000
June 5	62.2	4.9	230,000		11	63.3	19.0	70,000,000	1,400,000
12	65.7	4.3	1,100,000		18	36.9	29.0	5,500,000	800,000
19	66.5	3.7	230,000		24	52.1	11.0	940,000	
26	66.9	5.2	620,000		Total	2,817.2	569.8	275,278,000	148,933,000
July 3	80.5	5.0	3,400,000		Average	56.3	11.2	5,398,000	13,500,000

Date 1947	Coliform Organisms per 100 c. c.								
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RIO GRANDE AT LAREDO WATER PLANT

Jan. 3	0	Mar. 21	160	June 6	210	Aug. 22	70,000	Nov. 7	2,400
7	23	25	360	10	620	26	58,000	11	3,800
10	0	28	230	13	54	29	6,200	14	3,800
14	6	April 1	62	17	1,100	Sept. 2	11,000	18	2,400
17	0	4	54	20	140,000	5	24,000	21	2,400
21	360	8	360	24	70,000	9	16,000	25	1,100
24	360	11	13	27	70,000	13	6,200	28	620
28	28	15	23	July 1	2,400	16	24,000	Dec. 2	1,600
31	6	18	2,400	4	1,100	19	24,000	5	7,000
Feb. 4	54	22	360	8	1,100	23	6,200	9	1,700
7	6	25	23	11	3,800	26	3,400	12	1,600
11	21	29	3,800	15	940	30	3,800	16	1,100
14	0	May 2	24,000	18	1,300	Oct. 3	3,800	19	1,600
18	110	6	2,400	22	1,600	7	1,100	23	2,400
21	36	9	940	25	1,600	10	2,200	26	360
25	620	13	38,000	29	2,400	14	3,800	30	620
28	9	16	1,100	Aug. 1	7,000	17	130		
Mar. 4	2,400	20	11,000	5	70,000	21	620		
7	2,400	23	360	8	7,000	24	1,100		
11	62	27	3,800	12	7,000	28	360		
14	93	30	46	15	1,600	31	2,300		
18	14,000	June 3	1,600	19	2,400	Nov. 4	9,400	Total	797,019
								Average	7,660

RIO GRANDE 9.1 MILES BELOW LAREDO R.R. BRIDGE

Jan. 7	4	Mar. 11	11,000	May 20	24,000	July 29	38,000	Nov. 4	70,000
14	21	18	24,000	27	140,000	Aug. 12	22,000	18	38,000
21	14,000	25	24,000	June 3	38,000	19	240,000	2	6,200
28	200	April 1	28,000	10	140,000	Sept. 9	16,000	16	3,600
Feb. 4	45	8	24,000	17	16,000	23	24,000	23	24,000
11	4	22	4,200	July 1	6,200	30	6,200		
18	38	29	140,000	8	9,400	Oct. 7	24,000		
25	24,000	May 6	38,000	15	70,000	14	11,000		
Mar. 4	3,800	13	70,000	22	16,000	21	1,600	Total	1,389,510
								Average	33,900

RIO GRANDE AT MERCEDES PUMPS

June 30	940	Aug. 4	14,000	Sept. 29	1,600	Nov. 3	2,300	Dec. 8	2,300
July 8	550	Sept. 8	1,100	Oct. 6	620	10	360	15	360
15	2,400	15	7,000	13	1,100	17	1,100		
21	1,600	17	2,300	20	1,100	24	3,600		
28	1,600	22	13,000	27	620	Dec. 1	3,600	Total	63,150
								Average	2,870

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES—1947

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.

Island Station

Region Average 1979-1981 Total 1981 1,139 7.4%

Country Line 2018

100000 1941 100000 1941 100000 1941

Period Average 1940-1947 Total 1947 6.21 9.53

A. Budgeted Expenses 2012 2013 2014 actual 10/17 \$ 36 9.00

Page 1

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES—1947

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	Nominal or Average
Guayuco Arroyo Highway (U. S. 80) Bridge, Texas																												I. B. & W. C.					
Jan.	.03	.05						.01	.38								.20	.05											.73	.46			
Feb.																													0	.17			
Mar.																													.42	.22			
Apr.																													.21	.11			
May																													.56	.31			
June																													.11	.08			
July																													.18	1.60			
Aug.																													3.09	1.60			
Sept.																													.16	1.69			
Oct.																													.04	.24			
Nov.																													.64	.39			
Dec.																													.05	.06			
Period Average 1940-1947																													Total 1947	6.88	9.61		

Decker Bros. Ranch (Hollis Halsey *)											S. C. S.		
Standard gauge	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1.00			.3%										1.00 1.50
													.25 .81
													2.47 .53
													.53 .53
													1.37
													.13 .86
													.52 .86
													.05 .05
* Changed September, 1947													# Period Average 1945-1947

* Changed September, 1947

Some months missing

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES—1947

H. T. Fletcher Ranch												S. C. S.	
Standard gauge													
Jan.	.31	.18	.20	T	.37		.04	T	T	.11	T		.06
Feb.				T									.73
Mar.				T									.101
Apr.				T									.68
May				T									.31
June				T									.64
July				T									3.55
Aug.				T									1.49
Sept.				T									.25
Oct.				T									.02
Nov.				T									.07
Dec.				T									.05
July	.07	.08		T	.27	.14	.26	.20	.01	T	T		1.43
Aug.				T				T		.06	.06		2.43
Sept.				T				T		.02	.04		4.23
Oct.				T				T		.08	.04		.60
Nov.				T				T		.67	.67		.76
Dec.				T				T					.02

Some months missing

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES - 1947

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
Standard gauge																												Reid Bros. Ranch		S. C. S.			
Jan.																													2.00	1.66			
Feb.																													0	.28			
Mar.																													1.40	.39			
Apr.																													.19	1.04			
May																													9.70	1.75			
June																													1.20	1.29			
July																													1.05	2.29			
Aug.																													1.70	2.85			
Sept.																													.30	3.45			
Oct.																													.25	1.62			
Nov.																													.56	.56			
Dec.																													.75	.98			
																												# Period Average 1941-1947 Total 104" / 15.10 19.26					
No daily record available																																	

• Some months missing

RAINFALL ON THE UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES—1947

Some months missing = Estimated * Partly estimated

AVERAGE RAINFALL ON THE RIO GRANDE WATERSHED AND SUBDIVISIONS

IN INCHES—1947

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1947

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	Normal or Average Inches
-------	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-------	-----------------------------------

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1947

Delicias, Chih.

Standard gauge										Delicias, Chih.										Nat'l. Irrig. Com.				
Jan.	.31	T	.01	.20	.04	T	.10	.06	T				T	.61	T	T	T							
Feb.						T								.06										
Mar.						T			T	.02			T											
Apr.						T			T	.71	T		T			.16	T							
May						T			T	.71	T		T			.16	T							
June						T			T	.71	T		T			.16	T							
July						T			T	.05	T		T			.06	T	T	T	.16	T	.06	.36	.98
Aug.						T			T	.05	T		T			.06	T	T	T	.16	T	.06	.31	.80
Sept.						T			T	.04	T		T			.05	T	T	T	.16	T	.06	.31	.77
Oct.						T			T	.57	T		T			.05	T	T	T	.16	T	.06	.31	.66
Nov.						T			T	.08	T		T			.05	T	T	T	.16	T	.06	.31	.53
Dec.						T			T	.43	T		T			.05	T	T	T	.16	T	.06	.31	.53

Chihuahua, Chih.

Chihuahua, Chih. 1947

San Antonio, Durango

Maclovio Herrera (Falomir), Chih

Ojinaga, Chih.

Standard gauge		Ojinaga, Chih.												Meteor. Serv. of Mex.					
Jan.	.04			T	.31				.47	.16			T		T	.47	T	.96	.80
Feb.											T	.08				T	.19	.19	
Mar.																T	.29	.29	
Apr.																T	.57	.57	
May																T	.81	.81	
June																T			
July																T	0	1.05	
Aug.																T	1.51	1.51	
Sept.																T	.20	.20	
Oct.																T	.46	.46	
Nov.																T	.79	.79	
Dec.	1.06															T	1.26	1.26	

Palestina, Coah.

Piedras Negras, Coah

Some months missing

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1947

Some months missing

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES-1947

Standard gage		Guerrero, Tamps.												Meteor. Serv. of Mex.								
Jan.		T	T	.12	.04	.26	.27	T	T	T	T	.12	T	T	T	T	T	T	.04	T	T	
Feb.				T					T											T		
Mar.								T												T		
Apr.									T											T		
May										T										T		
June											T									T		
July												T								T		
Aug.	2.57	1.00	.71	.61	T							1.90	T							T	.17	.40
Sept.																					.27	1.60
Oct.																					.39	2.86
Nov.																					.56	2.74
Dec.																					.03	1.68
																					.04	1.04
																					.09	1.13
																					.07	1.26

Recording gauge		Rinconada, N. L.												Nat'l. Irrig. Com.	
Jan.	Feb.	T	.04	.06	.35	.07	.06	.01	.02	T	.04	.03	.05	.53	.54
Mar.	Apr.		.04	.02	.04	.07	.29	.06	.21	.01	.11	.03	.03	.04	.09
May	June						.01	.01	.04	.02	.02	.03	.03	.25	1.06
July	Aug.	.01	.68	T	.94	.87	.39	T	T	T	T	.28	.01	.17	T
Sept.	Oct.					.04		.30	T	T	T	T	.01	.72	3.31
Nov.	Dec.						T	.05	.17	.32	.06	T	T	T	1.62

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1947

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	Normal or Average	
Recording gauge																																	
Jan.	.61	.01	.01					.11	.41	.12						.03												T	1.18	1.66			
Feb.																															.56		
Mar.																															0	.25	
Apr.																															35	.56	
May																															56	.66	
June																															1.26	2.86	
July	.05																														2.02	1.77	
Aug.																															1.18	.28	
Sept.	1.58	2.97	3.27	2.05																												0	.85
Oct.																															0	.15	
Nov.																															57	.66	
Dec.																															61	1.05	
# Period 1938-1947																														Total	19.47	17.78	19.66

* Some months missing

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1947

Las Enramadas, N. L.												Lat ^o , Long ^o	
Standard time												Altitude	
Jan.		.20		.20		.16	.58					T	1,14 .67 2,00 3,86 5,93 6,86
Feb.						T	.27 .20 .39					T	1,14 .67 2,00 3,86 5,93 6,86
Mar.								2,56				T	1,14 .67 2,00 3,86 5,93 6,86
Apr.								T	.22	1,66		T	1,14 .67 2,00 3,86 5,93 6,86
May								T			.71	T	1,14 .67 2,00 3,86 5,93 6,86
June								T			.39 3,34	T	1,14 .67 2,00 3,86 5,93 6,86
July											.20	T	1,14 .67 2,00 3,86 5,93 6,86
Aug.												T	1,14 .67 2,00 3,86 5,93 6,86
Sept.												T	1,14 .67 2,00 3,86 5,93 6,86
Oct.												T	1,14 .67 2,00 3,86 5,93 6,86
Nov.												T	1,14 .67 2,00 3,86 5,93 6,86
Dec.												T	1,14 .67 2,00 3,86 5,93 6,86

Some months missing

RAINFALL ON THE MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES-1947

Reporting gauge		Linacre, N. L.												Rat'l. Irrig. Com.							
Jan.	.06			T	T	.25	.02			.06		T	.06	.06	.04	.08	.04	.02		.39	1.07
Feb.	.48					.05		T	T	.12									.94	.89	
Mar.								T	T	.09	.60								.17	1.02	
Apr.									T		.92								1.08	2.47	
May												.08	.12	T	.06				.85	1.05	
June				T										.10	T				.01		
July																					
Aug.	.05	.67	3.03	.37	.03					.03	.37								.23	2.40	
Sept.					T	T						.06	1.39	T					.99	3.35	
Oct.																			9.06	5.28	
Nov.																			.17	6.86	
Dec.																			2.07	2.49	

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, Red Bluff Dam, 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 also used at Dryden where it is maintained by the U. S. Section of the International Boundary and Water Commission. All Mexican stations are of this type except La Boquilla and Palestina, with the records furnished by the Meteorological Service of Mexico and the Ministry of Hydraulic Resources.

The pan at Palestina is the same type, set on a platform 3 feet above the ground, with the water kept 4 to 9 inches deep.

The pan at La Boquilla is of this type, but made of copper, set upon concrete pillars, with the water kept 5 to 8 inches deep.

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.

The new stations at Del Rio and Laredo are located as follows: Del Rio, Lat. 29° 20', Long. 100° 53', Elev. 1,018 feet; Laredo, Lat. 27° 32', Long. 99° 29', Elev. 470 feet.

In The United States

Month	Elephant Butte Dam, N. M.		Caballo Dam, N. M.		Jornada, N. M.		State College, N. M.		Ysleta, Texas Weather Bureau	
	1947	Normal 1933-1947	1947	Average 1942-1947	1947	Average 1938-1947	1947	Normal 1924-1947	1947	Average 1939-1947
Jan.	3.43	3.16	3.56	3.22	2.84	2.50	2.86	2.95	3.17	2.90
Feb.	5.59	5.14	5.49	5.35	4.89	4.08	4.61	4.48	4.69	4.46
Mar.	8.82	8.72	8.37	8.92	8.00	7.34	7.41	7.61	8.41	8.48
Apr.	13.22	12.17	12.94	12.14	11.35	10.15	10.11	9.79	10.39	10.96
May	15.14	15.14	14.49	15.79	12.98	13.21	12.42	11.71	13.26	13.40
June	17.38	17.10	17.46	17.20	15.15	14.69	13.13	12.89	12.70	13.62
July	16.37	14.40	15.85	15.98	15.41	12.81	13.48	11.72	12.78	12.31
Aug.	12.18	12.60	10.73	11.84	10.52	10.80	10.34	10.14	10.44	10.48
Sent.	12.23	9.93	11.20	10.07	9.30	8.66	9.58	8.22	9.33	8.46
Oct.	9.46	7.89	9.19	7.29	7.71	6.12	7.62	6.14	7.10	6.14
Nov.	5.42	4.99	4.76	4.89	3.28	3.70	3.84	3.91	4.37	3.85
Dec.	3.05	3.22	2.56	2.97	1.92	2.32	2.54	2.69	2.84	2.84
Total	122.29	114.46	116.60	113.66	105.33	96.71	97.94	92.21		98.06

Month	Dryden, Texas		Red Bluff Dam, Texas		Balmorhea, Texas Texas A. & M.		Balmorhea, Texas Weather Bureau		Grandfalls, Texas	
	1947	Average 1944-1947	1947	Average 1939-1947	1947	Normal 1926-1947	1947	Average 1940-1947	1947	Average 1940-1947
No. 1	3.67	3.57	4.03	4.25	3.18	1.66	2.31	1.89	2.41	3.42
Feb.	6.28	6.21	5.96	4.58	4.97	2.98	3.26	3.78	4.77	2.05
Mar.	7.85	7.72	10.10	7.50	8.76	3.68	5.12	4.52	7.81	8.46
Apr.	11.78	11.68	12.52	10.84	11.17	11.11	6.63	7.49	8.04	11.76
May	13.84	13.48	13.26	12.51	13.24	8.37	7.16	8.37	9.18	13.83
June	15.30	14.84	15.18	16.01	14.46	10.37	8.68	10.57	9.73	12.99
July	18.00	17.47	15.72	16.20	13.73	11.12	7.84	11.80	9.81	13.56
Aug.	13.40	12.74	12.93	12.79	9.67	7.06	9.67	8.86	14.66	13.38
Sept.	11.95	11.66	11.45	12.41	10.21	5.87	5.36	8.76	6.58	12.40
Oct.	9.87	9.87	7.00	8.17	6.47	5.58	4.15	7.16	4.99	9.22
Nov.	* 3.43	* 3.43	5.09	4.53	4.50	2.86	5.61	3.19	4.36	4.52
Dec.			4.05	2.91	3.21	2.03		2.45	2.59	3.00
Total	120.19	117.66	120.26		106.67		61.84		75.25	104.74

Month	Fort Stockton, Texas		Del Rio, Texas		Dilley, Texas		Laredo, Texas		Weslaco, Texas	
	1947	Average 1940-1947	1947	Average 1946-1947	1947	Normal 1928-1947	1947	Average 1946-1947	1947	Normal 1932-1947
Jan.	3.42	2.16	2.46	2.59	2.75	2.75	2.41	2.01	2.29	
Feb.	4.54	5.01	4.73	5.38	3.77	3.47	4.01	5.98	2.62	2.85
Mar.	7.68	8.53	7.03	8.02	6.25	6.07	8.23	9.82	4.05	4.23
Apr.	10.66	10.58	8.06	9.00	8.01	7.35	10.29	11.23	4.50	5.13
May	12.16	12.42	10.25	8.89	8.68	8.07	9.96	10.36	5.70	5.86
June	14.00	13.25	10.32	10.04	9.44	9.49	11.83	12.41	7.10	6.50
July	15.02	13.13	12.86	12.70	11.93	10.72	15.76	15.99	7.16	6.96
Aug.	11.85	11.34	10.04	12.06	9.53	10.62	11.29	12.82	4.97	6.67
Sept.	11.23	9.25	9.42	8.97	9.78	7.64	12.28	10.30	5.68	4.77
Oct.	9.52	6.65	8.09	6.72	7.22	5.88	10.01	8.66	1.88	4.43
Nov.	4.92	4.51	4.25	4.32	3.88	3.61	5.84	5.60	3.28	3.26
Dec.	3.27	3.70	2.71	3.14	2.53	2.62	3.07	3.00	1.85	2.34
Total		101.79	89.85	91.70	83.61	78.29	105.32		53.00	55.29

* Partly estimated

EVAPORATION IN THE RIO GRANDE BASIN
IN INCHES

In Mexico

Month	San Antonio, Durango		La Junta, Chih.		Villalba, Chih.		La Boquilla Dam, Chih.		Delicias, Chih.		Palestina, Coah.	
	1947	Average 1943-1947	1947	Normal 1936-1947	1947	Average 1940-1947	1947	Normal 1936-1947	1947	Average 1940-1947	1947	Normal 1931-1947
Jan.	3.21	4.60	1.90	2.70	5.23	3.76	4.02	2.83	3.75	5.50	5.37	4.74
Feb.	5.31	6.61	3.93	3.79	7.12	6.04	5.78	5.11	5.34	5.00	4.34	3.35
Mar.	9.76	10.22	6.09	6.30	11.43	10.87	9.48	8.31	8.71	8.34	7.11	6.35
Apr.	11.00	11.31	8.77	8.97	14.52	13.78	12.24	11.50	9.89	10.05	10.32	8.35
May	11.79	12.12	10.51	10.84	15.70	15.55	12.92	13.77	11.82	11.83	10.49	9.46
June	10.69	11.06	10.46	10.38	16.51	14.92	14.30	13.62	12.09	12.09	11.00	10.80
July	9.11	8.35	8.04	7.22	12.46	11.39	12.13	11.17	11.78	10.47	11.25	11.36
Aug.	5.21	7.65	* 5.01	6.15	8.57	9.54	7.77	9.40	7.35	8.46	9.48	11.57
Sept.	5.15	6.11	4.95	5.37	7.92	7.61	6.93	7.45	7.11	7.50	9.83	9.33
Oct.	5.11	5.63	4.48	4.81	8.63	7.03	6.95	6.36	6.07	10.30	8.23	8.23
Nov.	5.85	5.04	3.18	3.35	7.16	5.83	5.49	4.72	4.41	8.65	6.72	6.72
Dec.	3.93	3.93	2.39	2.48	4.86	4.53	3.41	3.54	3.48	9.11	5.79	5.79
Total	86.42	92.65	69.71	72.36		113.56	102.81	100.81		92.16	109.27	98.83

Month	Sabinas, Coah.		Don Martin, Coah.		Lag. De Selinillas, N. L.		Cd. Anahuac, N. L.		Monterrey, N. L.		Montemorelos, N. L.	
	1947	Average 1941-1947	1947	Normal 1927-1947	1947	Average 1936-1947	1947	Normal 1933-1947	1947	Normal 1921-1947	1947	Average 1941-1947
Jan.	2.98	3.06	6.07	3.53	2.92	3.89	1.67	2.55	3.93	4.01	2.70	2.64
Feb.	2.04	3.77	3.07	4.30	4.29	5.14	3.06	3.55	5.01	4.82	3.08	3.01
Mar.	2.09	6.83	5.31	7.40	7.65	8.43	6.14	6.23	7.89	6.66	6.08	5.63
Apr.	10.06	6.35	9.06	8.88	10.44	6.78	7.82	8.11	7.51	6.31	5.56	5.56
May	10.88	9.35	10.46	9.12	11.04	8.49	8.86	8.73	8.50	7.52	6.47	6.47
June	12.23	10.88	12.03	10.12	11.62	8.82	10.25	9.98	9.28	9.23	7.38	7.38
July	12.58	10.64	12.53	9.73	12.47	11.35	11.11	12.29	9.94	8.81	8.81	8.81
Aug.	12.26	7.81	12.07	6.21	11.82	8.09	10.81	7.74	9.05	7.11	8.40	8.40
Sept.	7.78	7.15	8.48	7.16	8.46	7.59	7.22	7.41	5.37	6.16	5.71	5.71
Oct.	5.84	6.69	6.37	6.28	6.69	6.22	5.41	6.10	4.66	4.43	3.83	3.83
Nov.	3.72	6.22	4.28	4.23	4.90	3.54	3.43	4.79	3.68	2.33	2.33	2.33
Dec.	2.11	2.38	1.84	3.27	2.72	3.68	3.00	2.40	3.54	3.44	2.23	2.23
Total		91.39	83.98	93.78	79.31	98.28	74.75	79.64	85.52	76.92		62.42

Month	El Cuchillo, N. L.		Saltillo, Coah.		La Tableta, N. L.		Ciénega De Flores, N. L.		Comales, Tamps.		Control (C-I-K), Tamps.	
	1947	Average 1940-1947	1947	Normal 1929-1947	1947	Average 1941-1947	1947	Average 1941-1947	1947	Average 1938-1947	1947	Average 1942-1947
Jan.	4.06	4.02	5.02	4.96	3.33	3.62	3.33	3.76	3.73	4.12	1.76	3.16
Feb.	4.44	5.21	5.08	5.23	3.96	4.58	4.02	4.58	5.77	5.84	1.65	3.13
Mar.	9.32	8.63	8.55	7.76	8.35	7.89	6.43	7.33	10.07	9.03	3.94	5.35
Apr.	9.96	10.06	8.37	9.29	8.47	8.54	6.78	8.01	12.06	10.76	7.03	6.45
May	11.87	10.98	9.60	9.36	10.56	9.50	8.59	8.97	12.44	12.15	7.76	7.55
June	14.36	12.27	9.70	9.94	11.55	9.92	9.91	9.44	15.86	13.71	9.39	7.70
July	14.34	14.08	9.35	8.93	12.92	11.44	13.65	10.59	15.50	15.45	10.21	8.70
Aug.	9.34	13.12	12.36	8.88	8.48	10.97	7.33	9.07	11.87	13.97	9.19	8.36
Sept.	10.14	9.13	9.14	6.76	9.63	7.37	6.37	6.88	12.60	9.95	6.68	5.88
Oct.	7.85	8.76	5.81	6.14	5.76	5.62	4.96	10.28	8.03	8.25	4.28	4.28
Nov.	4.70	4.88	5.60	5.01	4.70	4.43	3.59	4.58	5.09	5.66	3.46	3.47
Dec.	3.83	4.20		5.18	3.98	4.01	3.47	3.05	4.11	4.38	2.00	3.47
Total	104.80	103.27		86.94	93.85	87.83	81.29	81.86	118.58	113.02		70.71

* Partly estimated

TEMPERATURE, HUMIDITY, AND WIND AT DRYDEN EVAPORATION STATION

The temperature and humidity at Dryden Evaporation Station are recorded continuously by a hygro-thermographic 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 hygro-thermograph and anemometer, furnished by the U. S. Weather Bureau, began operating in June 1947. The mean temperatures and humidities below are integrated from the continuous record.

Month	Monthly Means at Dryden Evaporation Station			
	Temperature Degrees Fahrenheit	Relative Humidity Percent	Wind Miles per Hour	
July	84.7	46.4	5.4	
August	79.4	57.8	5.3	
September	77.8	48.4	3.2	
October	74.8	57.7	4.2	
November	55.7	55.3	4.1	
December	49.6	62.1	4.0	

DRAINAGE BASIN AND IRRIGATED AREAS
Along the Rio Grande and Tributaries—1947

The drainage basin areas tabulated below are derived from the best available sources, including topographic maps. 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-contributing 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 as tabulated are from the most reliable sources that are available, and include only those areas downstream from El Paso on the Rio Grande, and below Girvin on the Pecos River.

DESIGNATIONS OF AREAS AND GAGING STATIONS	Drainage Basin—Square Miles			Irrigated Areas—Acres			Total	
	In		Total	In		Secondary		
	United States	Mexico		United States	Mexico			
Above El Paso Station	29,267	0	29,267					
El Paso Station to American Dam	4	0	4	0	0	0	0	
Above American Dam	29,271	0	29,271					
American Dam to Juárez	41	47	88					
Above Juárez Station	29,312	47	29,359					
Juárez to Island	146	472	618					
Above Island Station	29,458	519	29,977					
Island to County Line	485	186	671					
Above County Line Station	29,943	705	30,648	56,420				
Guayucco Arroyo, above U. S. 80 Highway Bridge	162	0	162	0				
County Line to Fort Quitman, excluding Guayucco Arroyo	501	679	1,180	17,882				
County Line to Fort Quitman, including Guayucco Arroyo	665	679	1,342	17,882				
El Paso Station to Fort Quitman Station - total	1,539	1,584	2,723	74,302	48,679	0	122,981	
Above Fort Quitman Station	30,606	1,384	31,990	74,302	48,679	0	122,981	
Quitman Arroyo (I.B. & W.C. name) above measuring point near its mouth	36	0	36					
Quitman Arroyo (I.B. & W.C. name) above rocky canyon	18	0	18					
Red Light Arroyo (I.B. & W.C. name)(Quitman Arroyo on U.S.G.S. Maps) above measuring point near its mouth	260	0	260					
Van Horn Creek, above measuring point near its mouth	117	0	117					
Fort Quitman to La Nutria, excluding Quitman Arroyo, Red Light Arroyo, and Van Horn Creek	628	886	1,514					
Fort Quitman to La Nutria - total	1,041	886	1,927	2,447	6,425	0	8,872	
Above La Nutria Station	31,647	2,270	33,917	76,749	55,104	0	131,853	
Capote Creek, above measuring point near its mouth	93	0	93					
La Nutria to Upper Presidio - total	580	503	1,083	1,664	9,143	0	10,807	
Above Upper Presidio Station	32,227	2,773	33,000	78,413	64,247	0	142,660	
Rio Conchos, above Boquilla Dam	0	7,322	7,322	0	2,965	0	2,965	
Rio Conchos, below Boquilla Dam	0	17,419	17,419	0	172,479	12,108	184,587	
Rio Conchos - total	0	24,741	24,741	0	175,444	12,108	187,532	
Upper to Lower Presidio, excluding Rio Conchos	21	5	26	20	0	0	20	
Upper Presidio to Lower Presidio - total	21	24,746	24,767	20	175,444	12,108	187,572	
Above Lower Presidio Station	32,288	27,519	59,767	78,433	239,691	12,108	330,232	
Alamito Creek, above gaging station	1,504	0	1,504	214	0	0	214	
Terlingua Creek, above gaging station	1,070	0	1,070	80	0	0	80	
Lower Presidio to Johnson Ranch, excluding								
Alamito and Terlingua	1,439	2,671	4,110	2,022	3,459	1,977	7,458	
Lower Presidio to Johnson Ranch - total	4,013	2,671	6,684	2,316	3,459	1,977	7,752	
Above Johnson Ranch Station	36,261	30,190	66,451	80,749	243,150	14,085	337,984	
Johnson Ranch to Boquillas	471	3,735	4,206	0	0	0	0	
Above Boquillas Station	36,732	33,925	70,657	80,749	243,150	14,085	337,984	
Maravillas Creek, above proposed gaging station	2,192	0	2,192	0	0	0	0	
Lozier Creek, above gaging station	1,806	0	1,806	0	0	0	0	
Boquillas to Langtry, excluding Maravillas and Lozier	2,125	2,595	4,720	0	0	0	0	
Boquillas to Langtry - total	6,123	2,595	8,718	0	0	0	0	
Johnson Ranch to Langtry, excluding								
Maravillas and Lozier	2,596	6,330	8,926	0	0	0	0	
Johnson Ranch to Langtry - total	6,594	6,330	12,924	0	0	0	0	
Above Langtry Station	42,855	36,520	79,375	80,749	243,150	14,085	337,984	

DRAINAGE BASIN AND IRRIGATED AREAS
Along the Rio Grande and Tributaries—1947

DESIGNATIONS OF AREAS AND GAGING STATIONS	Drainage Basin—Square Miles			Irrigated Areas—Acres		
	In		Total	In		Total
	United States	Mexico		United States	Mexico	
Pecos River, above Girvin	29,562	0	29,562	0	0	0
Pecos River, Girvin to I.B. & W.C. gaging station	5,731	0	5,731	20	0	20
Pecos River, above I.B. & W.C. gaging station	35,293	0	35,293	20	0	20
Goodenough Spring, above gaging station	1	0	1	0	0	0
Devils River, above Juno gaging station	2,947	0	2,947	0	0	0
Devils River, below gaging station near Juno to I.B. & W.C. gaging station	1,238	0	1,238	0	0	0
Devils River, above I.B. & W.C. gaging station	4,185	0	4,185	0	0	0
Las Vacas Arroyo, above gaging station	0	146	146	0	741	494
Langtry to Del Rio, excluding above tributaries	416	2,495	2,911	8	0	8
Langtry to Del Rio - total	39,895	2,641	42,536	28	741	494
Above Del Rio Station	82,750	39,161	121,911	80,777	243,891	14,579
San Felipe Creek, above gaging station	46	0	46	842	0	842
Sycamore Creek, above gaging station	464	0	464	0	0	0
Pinto Creek, above gaging station	236	0	236	50	0	50
Rio San Diego, above gaging station	0	931	931	0	17,544	17,544
Rio San Diego, below gaging station	0	0	0	0	1,236	988
Rio San Diego, total	0	931	931	0	18,780	19,768
Las Moras Creek, above gaging station	165	0	165	567	0	567
Rio San Rodriguez, above gaging station	0	586	586	0	3,707	3,212
Rio San Rodriguez, below gaging station	0	0	0	0	2,471	3,213
Rio San Rodriguez, total	0	586	586	0	6,178	3,954
Del Rio to Eagle Pass, excluding above tributaries	584	581	1,165	20,344	2,471	3,212
Del Rio to Eagle Pass - total	1,495	2,098	3,593	21,803	27,429	26,027
Above Eagle Pass Station	84,245	41,259	125,504	102,580	271,320	22,733
Rio Escondido, above gaging station	0	1,130	1,130	0	6,178	8,649
Arroyo Amole - total	0	482	482	0	0	0
Eagle Pass to El Jardín, excluding above tributaries	736	1,191	1,927	1,581	247	0
Eagle Pass to El Jardín - total	736	2,803	3,559	1,521	6,425	8,649
Above El Jardín Des Site	84,981	44,066	129,043	104,101	277,745	31,382
Santa Isabella Arroyo, above river road	350	0	350	0	0	0
El Jardín to Laredo, excluding Santa Isabella	387	1,079	1,466	5,520	1,235	0
El Jardín to Laredo - total	737	1,079	1,816	5,520	1,235	0
Eagle Pass to Laredo, excluding above tributaries	1,123	2,270	3,393	7,041	1,482	8,523
Eagle Pass to Laredo - total	1,473	3,882	5,355	7,041	7,660	8,649
Above Laredo Station	85,718	45,141	130,859	109,621	278,980	31,382
Dolores Creek, above gaging station	606	0	606	0	0	0
Rio Salado, above Don Martín Dam	0	13,819	13,819	0	54,363	8,896
Rio Salado, below Don Martín Dam	0	7,709	7,709	0	57,082	10,131
Rio Salado, above gaging station	0	21,528	21,528	0	111,445	19,027
Laredo to Zapata, excluding above tributaries	491	942	1,433	+15,440	988	16,428
Laredo to Zapata, including Dolores, and excluding Salado	1,097	942	2,039	15,440	988	0
Laredo to Zapata - total	1,097	22,470	23,567	15,440	112,433	19,027
Above Zapata Station	86,811	67,611	154,426	125,061	391,413	50,409
El Tigre Arroyo, above gaging station	261	0	261	0	0	0
Rio Alamo, above gaging station	0	1,675	1,675	0	4,942	5,137
Zapata to Roma, excluding above tributaries	771	315	1,086	+4,827	0	10,379
Zapata to Roma, including El Tigre and excluding Alamo	1,032	315	1,347	4,827	0	4,827
Zapata to Roma - total	1,032	1,990	3,022	4,827	4,942	5,137
Above Roma Station	87,847	69,601	157,448	129,888	396,355	55,846
Rio San Juan, above Marte Gómez Dam	0	12,473	12,473	0	102,548	67,212
Los Olmos Creek, above gaging station	535	0	535	0	0	0
Mexican Side, below Marte Gómez Dam and San Pedro de Roma and above Rio Grande City	0	817	817	0	32,865	0
Rio San Juan, total	0	817	817	0	155,413	67,212
Roma to Rio Grande City, excluding above tributaries	143	387	530	+1,620	0	202,625
U.S. Side, Roma to Rio Grande City, including Los Olmos	678	0	678	1,620	0	1,620
Roma to Rio Grande City - total	678	12,860	13,538	1,620	135,413	67,212
Above Rio Grande City Station	88,525	82,461	170,986	131,508	531,768	123,058
Rio Grande City to Hidalgo	415	430	845			
Above Hidalgo Station	88,910	82,891	171,831			
Hidalgo to Mercedes Bridge Station	15	15	30		65,977	#
Above Mercedes Bridge Station	88,955	82,906	171,861		597,745	123,058
Mercedes Bridge to Matamoros Station	11	11	22			
Above Matamoros Station	88,966	82,917	171,883		597,745	123,058
Matamoros to Lower Brownsville Station	2	2	4		0	
Rio Grande City to Lower Brownsville Station	443	458	901	555,058	65,977	621,035
Above Lower Brownsville Station	88,968	82,919	171,887	686,566	597,745	123,058
Lower Brownsville Station to Gulf of Mexico				3,176	689,742	1,407,369
Above Gulf of Mexico						

In addition to the irrigated areas the following areas were dry-farmed in 1947: * 2,414 acres, # 418 acres, \$ 1,200 acres, # 57,575 acres, " 36,483 acres. * An additional 400 acres were irrigated in this section that are not included in the table.

