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WATER BULLETIN NUMBER 12

Flow of the Rio Grande
and
Tributary Contributions

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

1942

WITH MAXIMUMS, MINIMUMS AND NORMALS

SOME LONG TERM FLOWS, WATERSHED YIELDS, CHANNEL LOSSES AND
CONSUMPTIVE USES WITH THEIR RELATIONSHIPS TO WEATHER DATA

STORAGE CAPACITIES AND WATER IN STORAGE

SOURCES OF RIVER FLOW

DIVERSIONS

SILT, CHEMICAL AND SANITARY ASPECTS OF WATER QUALITY

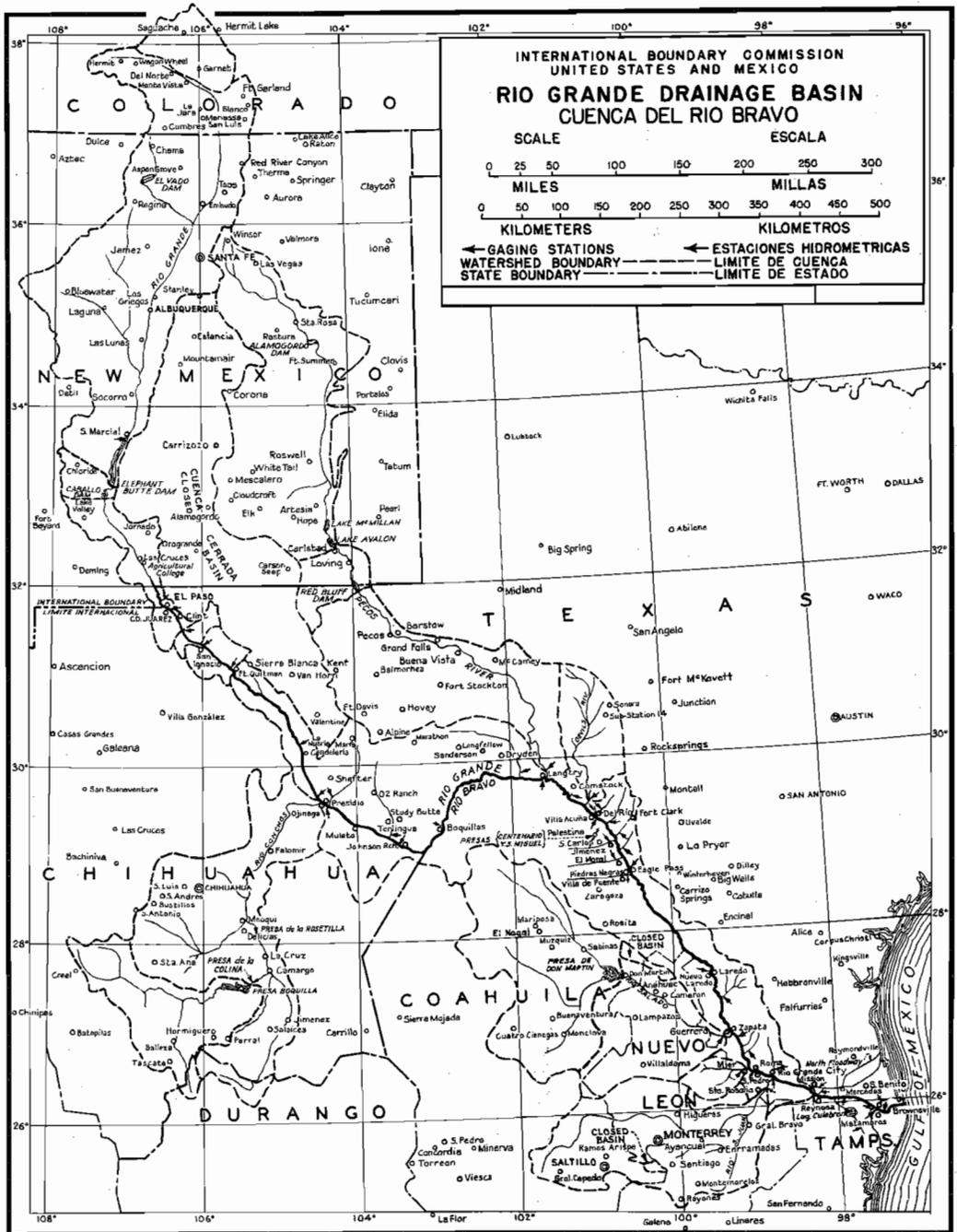
RAINFALL AND OTHER PERTINENT CLIMATOLOGICAL DATA

DRAINAGE BASIN AND IRRIGATED AREAS

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**RIO GRANDE DRAINAGE BASIN
CUENCA DEL RIO BRAVO**

FOREWORD

General Hydrologic Conditions for 1942

Along and Adjacent to The International Portion of the Rio Grande

During 1942 the precipitation was in general a little below normal and evaporation was in general a little above normal on both sides of the Rio Grande basin. Along the Rio Grande, wind movement and mean temperatures for the year were a little above normal. On the United States side of the Lower Rio Grande Valley, temperature and rainfall were slightly below normal. The average valley rainfall was 19.44 inches. A yearly rainfall of this average magnitude occurs with an average frequency of once in 3 years*.

The Don Martin Reservoir in Mexico with 66% of normal was the only exception to the rule that the monthly average amount of water in storage in the Rio Grande basin within both countries was very much above normal, being about 183% in the United States and about 118% in Mexico. This excessive storage was due to large carry-over from the year before.

The yearly flow of the Rio Grande was above normal from San Marcial, New Mexico, to the Gulf. At Fort Quitman, at the lower end of the El Paso-Juarez Valley, the flow was 465% of normal. At Rio Grande City, below the last tributary the flow was 132% of normal. These excessive flows were largely due to overflows from Elephant Butte and La Boquilla reservoirs, resulting from excessive carry-over storage from the previous year.

The United States measured tributaries below Fort Quitman flowed about 98% of their normal, while the measured Mexican tributaries flowed about 128% of normal.

Three flood peaks of note occurred at Rio Grande City during 1942. The first on May 21 reached a peak flow of 50,500 Sec. ft. It originated principally along the main river below Del Rio. On July 7 the second flood peak passed with a peak flow of 71,700 Sec. ft. Part of this flood came from the Rio San Juan and Rio Salado, but a larger portion came from along the main river below Eagle Pass. The third peak reached a crest of 72,900 Sec. ft., on September 9. It came partly from the Rio Salado and from the basin of the main river below Eagle Pass. The remainder or basic part, of about 25,000 Sec. ft., came from the Rio Conchos where La Boquilla Reservoir was overflowing. The crest of La Boquilla overflow, however, did not reach Rio Grande City until several days later.

Reflecting the subnormal rainfall and the abnormal temperature, wind movement and evaporation the average amount of water consumed in irrigation per acre of land was, in general, above normal. There was an overall increase in the acreage irrigated not withstanding a small decrease in some sections within the basin. Consequently, the total water diverted and consumed in irrigation in the basin was decidedly above normal. Municipal diversions from the Rio Grande were above normal.

Sanitary sampling and assaying of Rio Grande water in 1942 extended from El Paso to Laredo and showed such water to be suitable as a source of municipal water supply after adequate treatment by the various processes commonly used for such purpose, except in the region extending from just below El Paso to below Presidio. Within this region the coliform organism content was so high as to show that extraordinary treatment was required to render the water safe for human use. Likewise the water of the Rio Conchos, the Pecos and the Devils rivers was found to be suitable for human use if given the adequate treatment mentioned above, while the water of Fabens Waste, Tornillo Drain, Arroyo Las Vacas and San Felipe Creek was found to require the extraordinary treatment mentioned above to render them potable.

At San Marcial, New Mexico, about 8,050 acre feet of suspended silt passed down the Rio Grande. This was 73% of normal. At Eagle Pass about 18,400 acre feet of suspended silt passed the station. This was 171% of normal. At Roma 126% of normal silt or about 16,800 acre feet passed the station. The silt entering the Rio Grande from the Rio Alamo was about 375 acre feet or 72% of normal.

The annual tonnage of salts or total dissolved solids, carried by the Rio Grande at the various gaging stations and the tributary contributions, were above normal except on the Rio Salado where the contribution was a little below normal. The total tonnage of salts leaving the El Paso-Juarez Valley at Fort Quitman gaging station was for the second year in succession greater than that entering the Valley at the El Paso station. In 1942 for the second year in succession, the contribution to the Rio Grande of salts by the Pecos River was very much above normal, both as to total tonnage and average concentration. In fact the average concentration in 1942 was 5.99 tons of total dissolved solids per acre foot of water, the greatest of record. A fuller understanding of this menacing development may be gained from page 70 of this Bulletin.

* See P. 80, W.B. 10.

FOREWORD

This compilation of stream discharges and related data is the twelfth unified publication relative to the cooperative determination of the flow of the international portion of the Rio Grande. The first such publication was Water Bulletin No. 1, covering the year 1931. These data are published jointly by the United States and Mexican Sections of the International Boundary Commission and represent the results of stream flow measurements and related data from the Rio Grande and important tributaries near their confluence, from San Marcial, New Mexico, which is at the head of Elephant Butte reservoir, to the Gulf of Mexico, for the year 1942 as well as adjustments to and authentications of hydrographic records.

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

The duties and functions of the United States Section of the International Water Commission were transferred to the United States Section of the International Boundary Commission by Act of June 30, 1932. On January 1, 1932, the Mexican Section of the International Boundary Commission similarly took over the duties of the Mexican Section of the International Water Commission. On January 1, 1935, an International Water Commissioner for Mexico was again appointed, and though separated, the two Commissions functioned as one. In January 1941 the two Mexican Commissions were again combined into one.

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

Of stream gaging stations on the Rio Grande, those at Juarez, Eagle Pass, Laredo, Roma and Matamoros were operated in 1942 by the Mexican Section of the Commission, the others by the United States Section. Each section operated the gaging stations on tributaries entering the Rio Grande from its own country, or on floodways or diversions within its borders.

Of the 335,500 square miles of total area within the outer rim of the Rio Grande Basin, about 48.8% yield no run-off to the Rio Grande leaving 171,643 square miles of productive watershed. Approximately 2,870,000 acre feet per year is the average virgin yield of the upper 61,600 square miles of watershed above Fort Quitman and Girvin (on the Pecos) where 1,140,000 acres are irrigated and 3,600,000 acre feet of reservoir capacity regulates the flow. Approximately 2,200,000 acre feet per year is the average virgin yield of the upper 46,300 square miles of the Rio Conchos and Rio Salado where 286,000 acres are irrigated and 3,240,000 acre feet of reservoir capacity regulates the flow. About 4,000,000 acre feet per year is the average virgin yield of the remaining lower 63,800 square miles of watershed in both countries where 794,000 acres are irrigated and only 290,000 acre feet of reservoir capacity regulates the flow. From the Rio Grande 3,750,000 acre feet per year, average, escapes to the Gulf of Mexico.

As a wartime conservation measure the size of this Water Bulletin is reduced, data is compressed on the pages, and the index to all Water Bulletins is omitted. For finding all of the data for a particular stream measuring station or a particular subject, etc., please refer to the index to all Water Bulletins, pages 106-111 in Water Bulletin No. 10.

A factual picture of the Rio Grande along the international boundary, the various important aspects of the quantity and quality of its water, and the uses thereof, is more easily gained from the mass of essential detailed data in the Water Bulletins if the reader will look to the generalizations of the data which appear at the lower side and right-hand side of the tabulations, and also to the maps and graphs.

Acknowledgments

Some of the data published herein relative to drainage basin and irrigated areas, chemical and bacteriological analyses, stored water, evaporation and rainfall have been furnished by the following agencies within the two countries: United States Department of Agriculture, United States Bureau of Reclamation, United States Army, U. S. Soil Conservation Service, Rio Grande Compact Commission, Texas Agriculture and Mechanical College, Texas State Board of Health, El Paso City-County Health Unit, El Paso Department of Water and Sewage, Federal Board of Public Improvements of Nuevo Laredo, Tamaulipas, National Irrigation Commission of Mexico, Cia. Agricola y de Fuerza Electrica Del Rio Conchos, S.A., Mexican Department of Agriculture and Development, National Bank of Agricultural Credit of Mexico, Meteorological Service of Mexico, and private individuals and corporations. Specific acknowledgment is made where the data appear.

RIO GRANDE AT SAN MARCIAL STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and winch located at railroad bridge about one mile below San Marcial, New Mexico, and 177.1 miles above the American Dam at El Paso, Texas. The recorder is on the upstream end of the first bridge pier from the south abutment of the bridge and the zero of its gage is 4,455.38 feet, United States Coast and Geodetic Survey sea level datum. The recorder was moved to the downstream end of the south abutment of the bridge on May 26, 1942. Zero of this gage is 4,459.08 feet (same datum). The recorder was returned to the original location on July 1, 1942.

RECORDS: Based upon 133 meter measurements, by wading, and from cable about 1,000 feet above railroad bridge (125 measurements by I.B.C. and 8 by U.S.G.S.). Computations by shifting channel methods. 1942 records good. Records available: January 1895 to December 1942. Elsewhere herein will be found the monthly distribution of the record for 1895 and 1896, also monthly and annual normals 1895 to 1942. A slight error was made in the July total for this station in W. B. 5, p. 6. The correct total is 35,600 acre feet.

REMARKS: For gage history 1895 to 1938 see Water Bulletin Nos. 4, 7 and 8. Since April 1937 the river has been flowing through the Val Verde area, but on July 16, 1942 it returned to its old channel and is now passing under the highway bridge. See W. B. No. 7. El Vado and smaller reservoirs and many irrigation diversions and drainage returns above this station in Colorado and New Mexico modify the river flow.

COMPARATIVE FLOWS FROM RECORDS: **Momentary Peak:** Max., Oct. 11, 1904, 50,000 sec. ft. with water surface level of 4,459.5 ft. on U.S.C. & G.S. datum about .25 mile above the present station gage. This is the greatest flood peak flow in at least the past 114 years, or since 1828. **Min.,** sometimes dry. See Water Bulletin No. 6, page 79, for large peak flows since 1828 and their average frequency. **Daily:** Max., Oct. 11, 1904 33,000 sec. ft. average. **Min.,** sometimes dry. **Monthly:** Max., May 1941, 16,159 sec. ft. average. **Min.,** sometimes dry. **Yearly:** Max., 1941, 3,911 sec. ft. average. **Min.,** 1902, 277 sec. ft. average. **Two Successive Years:** Max., 1941 and 1942, 3,300 sec. ft. average. **Min.,** 1899 and 1900, 487 sec. ft. average. **Three Successive Years:** Max., 1905 to 1907, 2,830 sec. ft. average. **Min.,** 1900 to 1902, 609 sec. ft. average. **Four Successive Years:** Max., 1905 to 1908, 2,390 sec. ft. average. **Min.,** 1899 to 1902, 539 sec. ft. average. **Five Successive Years:** Max., 1905 to 1909, 2,260 sec. ft. average. **Min.,** 1898 to 1902, 697 sec. ft. average. **Ten Successive Years:** Max., 1903 to 1912, 1,980 sec. ft. average. **Min.,** 1931 to 1940, 1,140 sec. ft. average. **Forty-Eight Year Average:** 1,580 sec. ft.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1	1,360	1,140	1,170	1,540	10,500	11,900	1,190	320	354	580	422	304	
2	1,340	1,200	1,100	1,670	9,620	11,700	1,190	366	465	515	376	298	
3	1,320	1,190	940	1,820	8,310	10,700	2,140	447	557	506	352	455	
4	1,290	1,190	845	2,030	9,210	11,300	2,150	921	437	485	411	473	
5	1,250	1,050	945	2,810	9,050	10,800	1,060	710	799	497	543	497	
6	1,160	1,180	833	3,890	7,960	10,700	950	509	992	377	480	447	
7	1,160	1,210	930	4,950	7,770	10,400	834	425	710	494	412	645	
8	1,110	1,160	1,450	5,850	8,070	9,850	915	650	*1,030	616	366	785	
9	1,000	1,030	1,680	4,640	8,710	9,200	575	845	893	499	318	846	
10	* 945	1,210	1,740	4,230	9,570	8,700	478	553	533	464	265	904	
11	1,180	1,450	1,120	3,940	10,800	7,780	423	653	395	485	309	852	
12	1,500	1,330	760	4,350	11,700	7,400	639	971	1,220	606	331	849	
13	1,240	1,150	790	5,130	12,600	7,550	696	726	2,800	630	331	750	
14	1,200	1,040	1,210	5,810	14,400	7,580	640	580	2,750	825	237	707	
15	1,120	1,170	1,540	5,790	14,400	8,260	846	437	1,560	681	226	725	
16	1,140	1,120	1,990	5,230	13,600	7,140	648	428	1,100	556	243	828	
17	1,200	1,140	2,800	6,110	12,000	6,500	668	519	949	624	236	841	
18	2,120	1,050	2,150	7,710	9,350	6,310	536	722	844	727	231	874	
19	*1,180	980	1,910	9,510	8,840	5,630	604	685	340	821	246	944	
20	1,230	1,010	1,890	11,600	8,540	4,960	596	438	733	796	259	924	
21	1,300	1,010	1,600	11,300	8,300	4,490	475	299	666	814	232	990	
22	1,200	900	1,800	10,000	8,810	4,680	678	247	708	666	237	1,020	
23	1,140	850	1,960	9,050	9,470	4,610	550	221	779	589	251	969	
24	1,060	915	1,670	9,080	10,200	3,980	313	279	668	573	250	968	
25	1,110	1,110	1,380	12,900	10,400	3,790	316	1,030	650	322	319	968	
26	1,120	1,130	1,850	17,800	10,700	3,490	372	955	532	486	428	1,020	
27	1,100	1,110	2,200	14,500	10,900	2,690	349	564	505	384	402	1,080	
28	1,100	1,100	1,960	12,000	10,800	2,370	377	445	534	390	348	1,110	
29	1,080	1,950	1,950	11,600	11,000	2,110	586	481	488	488	315	1,150	
30	1,100	1,730	10,900	11,700	1,840	709	469	734	407	407	282	1,010	
31	1,130	1,790	11,900	11,900	564	564	402	402	418	418	1,030	1,030	
Sum	36,985	31,125	47,683	217,720	319,180	208,410	21,267	17,237	26,225	17,521	9,658	25,263	
1942											Period 1924-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	High	Low	Day			Normal	Maximum	Minimum		
Jan.	4.34	3.76	12	1,580	10	880	1,180	72,600	44,134	72,600	17,400		
Feb.	4.45	4.11	11	1,600	23	825	1,110	61,700	48,323	77,200	29,600		
Mar.	5.78	4.20	16	4,160	12	700	1,540	94,600	62,069	119,000	23,400		
Apr.	10.10	4.63	26	18,400	1	1,410	7,260	432,000	139,875	432,000	16,850		
May	6.10	2.97	14	15,100	7	7,400	10,300	633,000	298,923	994,000	4,450		
June	6.30	3.78	1	12,100	30	1,580	6,950	413,000	170,677	609,000	228		
July	7.70	6.46	4	1,480	24	290	686	42,200	60,321	246,000	0		
Aug.	7.98	6.45	25	1,490	23	177	556	34,200	49,289	275,000	1,620		
Sept.	9.79	6.96	13	4,230	11	318	874	52,000	58,822	308,000	2,920		
Oct.	8.17	7.31	21	872	28	326	565	34,800	43,553	221,000	0		
Nov.	7.85	7.05	5	572	14	207	322	19,200	35,772	171,000	2,550		
Dec.	8.83	7.60	29	1,300	1	250	815	50,100	44,188	95,300	15,100		
Yearly	10.10	2.97		18,400	177	2,679	2,679	1,939,400	1,056,146	2,832,100	244,489		

* Estimated * Partly Estimated

RIO GRANDE AT BELOW ELEPHANT BUTTE DAM STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car with winch. Prior to January 17, 1939 the recorder was located at the south side of the pool immediately below the dam. The cable was 1 mile below the recorder. Zero of this gage was elevation 4,255.10 feet on United States Coast and Geodetic Survey sea level datum. On January 17, 1939 a temporary water-stage recorder was established 1900 feet below the dam with zero of the gage at elevation 4,242.24. On March 29, 1939 the zero of this gage was changed to elevation 4,240.94 on the above mentioned sea level datum. On April 25, 1942 the water stage recorder was moved to a point 100 feet above the cable. Zero of this gage is 4,242.09 feet on the above mentioned sea level datum. Elephant Butte Dam is 135.1 river miles above the American Dam at El Paso.

RECORDS: Based upon 84 meter measurements during the year and a stable rating curve. Records available 1915 to 1942. 1942 records excellent. Records furnished by the El Paso Office of the United States Bureau of Reclamation.

REMARKS: The station described here is operated by the Reclamation Bureau. It has been the official station since 1931. Prior to 1931 it was located at other points in the immediate vicinity. See United States Geological Survey Water Supply Papers. The river flow at this station is completely modified by irrigation diversions, drainage returns and reservoirs. Elephant Butte Dam is 42.0 river miles downstream from the San Marcial gaging station at the upper end of Elephant Butte Reservoir.

EXTREME FLOWS: The greatest mean daily flow to pass Elephant Butte Dam (since storage began on January 6, 1915) occurred May 22, 1942, when the flow was 8,220 second feet. Beginning December 1940 power generation facilities for 27,000 K.V.A. began operating here. Since then minimum flows vary according to power generation.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,350	1,210	1,390	1,000	6,340	8,050	5,500	3,610	1,500	1,280	1,050	1,120
2	1,410	1,450	1,470	1,030	6,450	8,000	5,380	3,620	1,370	1,230	1,090	1,200
3	1,460	1,490	1,510	1,010	6,510	7,830	4,540	3,740	1,200	1,210	1,100	1,150
4	1,340	1,460	1,420	1,010	6,680	6,530	3,950	3,720	1,260	1,080	1,090	1,120
5	1,420	912	1,490	938	6,720	6,350	3,930	2,980	1,230	1,190	1,100	1,160
6	1,450	1,370	1,310	986	6,720	6,280	4,040	1,620	1,050	1,250	1,100	1,050
7	1,450	1,290	1,030	1,022	6,570	6,200	4,060	1,500	1,170	1,230	1,120	1,140
8	1,370	1,260	1,010	1,090	6,900	6,250	4,080	1,410	1,230	1,190	1,040	1,550
9	1,370	1,380	1,040	1,020	7,430	6,160	4,080	1,290	1,200	1,160	1,090	1,670
10	1,370	1,320	1,050	1,110	7,430	6,420	2,770	1,390	1,190	1,240	1,140	1,410
11	1,310	1,410	1,040	1,320	7,560	6,350	1,640	1,500	1,100	957	1,110	1,090
12	1,410	1,420	1,010	1,350	7,950	6,350	1,530	1,540	1,200	432	1,150	1,040
13	1,440	1,430	970	1,790	7,850	6,180	1,590	1,500	937	1,280	1,130	955
14	1,440	1,420	1,000	2,670	7,920	6,140	1,640	1,470	1,100	1,280	1,080	963
15	1,430	1,330	897	2,590	7,980	6,290	1,620	1,040	1,190	1,250	971	958
16	1,430	1,400	961	2,730	8,040	6,210	1,640	1,350	1,150	1,160	1,100	1,080
17	1,410	1,350	994	2,650	7,980	6,150	2,480	1,510	1,140	1,240	1,140	1,100
18	1,340	1,410	998	2,610	8,040	6,200	3,750	1,550	1,140	1,190	1,160	1,080
19	1,400	1,380	998	2,500	8,110	5,970	3,560	1,570	1,140	1,190	1,110	1,100
20	1,410	1,290	1,010	2,740	8,160	5,510	3,720	1,570	1,030	1,190	1,120	1,090
21	1,410	1,390	1,030	3,240	8,190	5,180	3,810	1,590	1,100	1,190	1,110	1,090
22	1,410	1,350	913	3,130	8,220	5,310	3,710	1,490	1,130	1,240	1,010	1,050
23	1,440	1,420	906	3,620	8,000	5,620	3,810	1,320	1,130	1,240	1,120	1,070
24	1,430	1,470	1,040	4,090	8,070	5,360	3,920	1,430	1,160	1,140	1,160	1,110
25	1,320	1,460	983	4,650	8,140	5,440	3,720	1,470	1,180	1,110	1,100	911
26	1,440	1,430	957	4,930	8,100	5,370	3,610	1,490	1,200	1,190	1,070	1,010
27	1,430	1,480	996	5,650	8,100	5,290	3,680	1,490	1,110	1,220	1,130	1,020
28	1,420	1,480	973	6,300	8,020	5,070	3,640	1,470	1,170	1,190	1,170	1,110
29	1,390	950	6,440	7,820	5,260	3,670	1,480	1,210	1,120	1,220	1,060	1,110
30	1,460	978	6,330	7,850	5,610	3,620	1,460	1,220	1,170	1,100	1,100	1,330
31	1,440	1,030	7,780	7,780	3,570	1,460			1,190			1,200
Sum	43,620	36,462	33,354	81,524	235,630	182,940	106,360	55,530	35,137	36,329	33,021	35,037

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	High		Low	Normal			Maximum	Minimum		
			Day		Day							
Jan.			‡ 3	1,460	11	1,310	1,410	86,500	11,640	86,500	184	
Feb.			3	1,490	5	912	1,370	76,300	29,799	76,300	969	
Mar.			3	1,510	15	897	1,080	66,200	60,048	88,700	1,520	
Apr.			29	6,440	5	938	2,720	162,000	113,942	162,000	57,200	
May			22	8,220	1	6,340	7,600	467,000	122,753	467,000	73,100	
June			1	8,050	28	5,070	6,100	363,000	131,989	363,000	82,000	
July			1	5,500	12	1,530	3,430	211,000	129,026	211,000	98,000	
Aug.			3	3,740	15	1,040	1,790	110,000	120,942	162,000	78,800	
Sept.			1	1,500	13	937	1,170	69,700	72,800	129,000	25,000	
Oct.			‡ 1	1,280	12	432	1,170	72,100	23,391	72,100	506	
Nov.			28	1,170	15	971	1,100	65,500	23,099	158,000	884	
Dec.			9	1,670	25	911	1,130	69,500	20,885	87,300	916	
Yearly								2,510	1,818,800	860,314	1,818,800	637,544

‡ Mean Daily † And Other Days

RIO GRANDE AT EL PASO STATION

DESCRIPTION: Staff gage and cable with ~~sl~~-down cable car and winch located in the pass opposite Courchesne quarry, 4 miles northwest of El Paso, Texas, and 5 miles northwest of Cd. Juarez, Chihuahua, and .9 river mile above the American Dam. Zero of gage is 3,720.51 feet above U.S.C. & G.S. mean sea level datum. Also water-stage recorder 1 mile farther upstream with zero of its gage 3,722.30 feet on the above mentioned datum. This later gage has been the official gage since August 3, 1938. This gage was lowered .22 foot on September 13, 1938. The elevation of 3,722.52 reported in Water Bulletin Nos. 8, 9 and 10 was accordingly erroneous. ~~for the period July 1 - 21, 1942 were based upon 3 meter measurements made~~

RECORDS: The daily discharges ~~during that period.~~ All other discharges in 1942 were computed by taking the sum of the flows in the American Canal and the flows at the Below American Dam Station. 1942 record good. Records available 1889 to 1942, inclusive. Fifty-four year monthly and annual normals, some estimated and some heretofore unpublished records for this station will be found elsewhere in this bulletin.

REMARKS: Reservoirs on the Rio Grande and its tributaries, also many irrigation diversions and drainage returns, completely modify the river flow at this station.

COMPARATIVE FLOWS FROM RECORDS: Momentary Peak: Max., June 12, 1905, 24,000 sec. ft., with 6.0 ft. stage (lower gage). This is the greatest peak flow in the past 114 years or since 1828, or possibly longer. Min. sometimes dry. Daily: Max., June 12, 1905, 23,680 sec. ft. average. Min., sometimes dry. Monthly: Max., June 1905, 14,300 sec. ft. average. Min. sometimes dry. Yearly: Max., 1905, 2,780 sec. ft. average. Min., 1902, 70.1 sec. ft. average. Two Successive Years: Max., 1905 and 1906, 2,160 sec. ft. average. Min. 1899 and 1900, 168 sec. ft. average. Three Successive Years: Max. 1905 to 1907, 2,280 sec. ft. average. Min., 1900 to 1902, 269 sec. ft. average. Four Successive Years: 1904 to 1907, 1,880 sec. ft. average. Min., 1899 to 1902, 227 sec. ft. average. Five Successive Years: Max., 1903 to 1907, 1,790 sec. ft. average. Min., 1898 to 1902, 367 ~~1~~ sec. ft. average. Ten Successive Years: Max. 1903 to 1912, 1,560 sec. ft. average. Min., 1895 to 1902, 650 ~~1~~ sec. ft. average. Fifty Four Years: Average 1,010 sec. ft. See Water Bulletin No. 6, page 79, for all large peak flows since 1828 and their average frequency. Since Elephant Butte Dam was closed in 1915 the largest peak flow to pass this station was 13,500 sec. ft. on September 3, 1925. See Water Bulletin No. 10, page 77 for peak flood flows, 1916 to 1937.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	215	220	1,150	1,120	5,970	4,570	5,440	2,170	2,950	2,510	254	403
2	216	224	1,090	1,260	5,770	4,570	5,750	2,770	2,740	2,450	355	336
3	218	233	1,110	1,250	6,380	4,340	5,740	2,920	2,750	1,610	356	393
4	214	394	1,070	1,070	5,960	4,680	5,650	2,730	2,550	1,420	430	349
5	217	868	1,060	1,230	6,130	4,530	4,250	2,660	2,630	1,360	435	321
6	226	1,180	996	1,270	6,080	5,250	3,950	2,730	2,840	1,280	517	333
7	221	1,100	1,080	1,340	5,800	5,860	3,470	2,070	2,480	1,110	480	302
8	218	1,210	1,190	1,520	6,200	5,810	3,510	2,040	2,340	1,100	402	298
9	218	1,490	1,150	1,350	5,900	5,570	3,310	2,530	2,200	1,130	432	268
10	218	1,780	1,140	1,030	6,070	5,360	3,200	2,110	2,100	1,220	409	250
11	196	1,280	1,080	924	6,080	5,280	3,100	1,770	2,250	1,220	336	234
12	202	1,180	1,110	1,260	6,090	5,100	1,660	2,110	2,410	1,260	307	275
13	215	1,150	1,080	1,500	6,270	4,610	2,290	2,120	3,140	1,030	296	573
14	225	1,190	981	1,390	6,540	4,790	2,170	1,960	3,840	1,060	280	579
15	215	1,470	1,030	1,680	6,570	4,990	2,040	2,040	3,190	1,060	277	571
16	215	1,060	1,070	1,920	6,400	5,470	2,260	2,930	3,050	1,020	256	579
17	227	1,690	927	1,970	6,690	5,140	2,080	3,100	3,010	1,050	256	645
18	217	1,060	890	1,960	6,910	5,030	1,970	2,320	3,350	882	249	669
19	205	1,000	852	2,240	6,830	4,800	2,870	2,270	3,780	697	241	803
20	210	992	876	2,200	7,000	5,160	2,800	2,120	2,510	568	219	614
21	209	890	839	2,130	6,680	5,230	3,070	2,200	3,220	512	196	547
22	203	712	769	2,540	6,220	5,300	2,590	2,220	3,150	480	208	543
23	202	744	830	2,890	5,050	5,080	2,660	2,450	3,020	437	414	452
24	204	711	687	2,940	5,020	5,130	2,660	3,290	3,300	413	374	429
25	200	704	791	3,840	4,580	5,460	2,970	3,980	3,380	403	388	371
26	198	685	1,120	4,200	4,490	5,180	3,250	3,050	3,490	369	440	343
27	206	864	1,090	4,910	4,330	5,200	3,360	3,080	2,780	349	418	312
28	206	1,040	1,000	5,590	4,460	5,480	2,890	3,020	2,710	329	461	303
29	210		997	5,700	4,420	5,300	2,820	2,850	2,660	305	453	283
30	210		1,270	5,900	4,340	4,950	3,140	3,090	2,620	288	454	272
31	215		1,200		4,570		2,840	2,960		288		263
Sum		26,321		70,124		153,420		79,460		29,210		12,913
	6,561		31,525		179,800		92,760		86,440		10,593	

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1924-1942 Acre Feet		
	High	Low	High		Low	Normal			Maximum	Minimum	
			Day		Day						
Jan.	3.71	3.48	14	241	27	152	212	13,000	11,032	17,500	8,210
Feb.	5.53	3.61	10	1,980	1	152	940	52,200	21,141	52,200	7,230
Mar.	5.38	4.28	30	1,450	24	582	1,020	62,500	39,836	62,500	18,400
Apr.	8.00	4.96	30	* 6,080	11	* 890	2,340	139,000	66,811	139,000	44,900
May	8.67	7.05	20	7,000	27	4,330	5,800	357,000	81,729	357,000	47,600
June	7.92	7.00	7	5,860	5	4,530	5,110	304,000	82,086	304,000	56,200
July	8.05	4.69	4	5,980	12	1,330	3,220	198,000	86,568	198,000	68,900
Aug.	7.42	5.13	25	4,760	11	1,570	2,560	158,000	89,612	158,000	61,000
Sept.	8.28	5.24	14	5,350	20	1,860	2,880	171,000	68,774	171,000	41,700
Oct.	6.20	3.79	2	2,680	30	253	942	57,900	27,417	57,900	17,800
Nov.	4.61	3.75	6	368	22	179	353	21,000	18,115	29,500	11,400
Dec.	4.94	3.76	19	854	11	221	417	25,600	17,019	27,700	9,590
Yearly	8.67	3.48		7,000		152	2,154	1,559,200	610,140	1,559,200	453,900

† In Water Bulletins Nos. 5 to 11 inclusive this figure should have been 367 sec. ft.
 †† In Water Bulletins Nos. 5 to 11 inclusive this figure should have been 650 sec. ft. for the period 1893 to 1902. * Partly Estimated. @ Mean Daily Extreme.

RIO GRANDE AT BELOW AMERICAN DAM STATION

DESCRIPTION: From June 2, 1938 to February 28, 1941 the water-stage recorder was located at the lower side of the American Dam 2.1 miles above the International Dam near El Paso, Texas. Zero of the recorder gage is 3,712.30 feet. Prior to January 1, 1939, zero of this gage was 3,722.30 feet. From May 1, 1939, to March 1, 1941, the official gage was a staff gage located 3,200 feet below the American Dam, the zero of which was 3,716.28 feet. On March 1, 1941, the recorder was moved to this site and the zero of the gage changed to 3,712.30 feet. At this site there is also a cable with sit-down cable car equipment for winch and heavy weights. The above elevations are in U.S.C. & G.S. sea level datum. The American Dam is 1,241.4 river miles above the Gulf of Mexico.

RECORDS: Based upon 58 meter measurements at normal and low stages during the year, 54 by the United States and 4 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: June 1, 1938 to December 31, 1942.

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" elsewhere herein) and the remainder, including excess flood flows, passed this gaging station. Reservoirs, diversions and drainage returns in the United States above this point completely modify the river flow.

EXTREME FLOWS: The largest peak flow to pass this station since 1828, or possibly before, was 24,000 second feet on June 12, 1905. Since Elephant Butte Reservoir was closed in January 1915, the largest peak flow was 13,550 second feet on September 3, 1925. See Water Bulletins Nos. 6 and 10, for the average frequency of all floods since 1828. Minimum, sometimes dry.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	218	588	* 83.8	4,950	3,720	♠ 4,670	1,500	2,150	1,740	2.6	* 2.2
2	3.2	222	545	103	4,740	3,750	♠ 5,070	2,110	1,950	1,680	2.8	" 2.1
3	3.1	231	427	112	5,360	3,730	♠ 5,080	2,270	1,950	850	2.9	" 2.1
4	3.3	81.9	392	110	4,990	3,870	♠ 4,920	2,080	1,730	655	2.8	" 2.0
5	3.3	472	396	114	5,160	3,680	♠ 3,490	1,980	1,790	605	2.7	" 2.0
6	3.2	869	369	111	5,130	4,350	♠ 3,240	2,040	2,050	490	2.7	" 1.9
7	3.1	798	399	107	4,850	4,880	♠ 2,780	1,420	1,680	324	2.6	" 1.9
8	3.1	903	448	309	5,250	4,850	♠ 2,800	1,350	1,490	307	2.5	* 1.8
9	3.1	1,080	414	253	4,960	4,640	♠ 2,590	1,630	1,370	327	2.5	" 1.8
10	3.1	1,250	402	90.5	5,120	4,430	♠ 2,470	1,390	1,270	404	2.7	" 1.8
11	115	797	371	101	5,120	4,340	♠ 2,310	1,040	1,440	407	* 2.6	" 1.8
12	199	721	377	182	5,140	4,160	♠ 886	1,420	1,610	447	2.4	" 1.8
13	212	737	372	128	5,320	3,660	♠ 1,540	1,440	2,380	258	2.5	" 1.8
14	127	784	340	133	5,610	3,810	♠ 1,480	1,260	" 3,030	267	2.6	" 1.8
15	3.7	801	356	321	5,650	4,010	♠ 1,450	1,400	2,420	258	2.4	" 1.8
16	3.9	684	358	637	5,460	4,520	♠ 1,700	2,230	2,240	225	2.5	" 1.8
17	3.8	756	290	922	5,740	4,210	♠ 1,510	2,360	2,230	198	2.6	" 1.9
18	3.7	710	384	931	5,950	4,100	♠ 1,420	2,570	2,590	75.4	2.6	" 1.9
19	134	654	403	1,180	5,870	3,880	♠ 2,160	1,540	3,020	6.1	2.6	" 2.0
20	207	608	293	1,180	6,040	4,230	♠ 2,100	1,410	1,690	4.4	2.6	" 2.0
21	206	511	182	1,240	5,710	4,300	2,340	1,470	2,430	3.6	2.5	" 2.1
22	200	378	169	1,590	5,300	4,390	1,850	1,480	2,380	3.1	2.1	* 2.1
23	199	414	192	1,850	4,230	4,220	1,950	1,710	2,220	2.8	2.5	" 2.1
24	202	412	91.6	1,850	4,240	4,260	1,970	2,560	2,500	2.7	2.5	" 2.1
25	197	370	29.8	2,780	3,780	4,560	2,280	3,200	2,560	2.0	2.2	" 2.1
26	195	342	32.6	3,230	3,680	4,280	2,600	2,290	2,660	2.3	2.6	" 2.0
27	194	387	35.4	3,840	3,460	4,320	2,700	2,320	2,010	2.3	2.7	" 2.0
28	203	590	39.0	4,420	3,610	4,570	2,210	2,230	1,930	2.4	2.7	" 2.0
29	207		39.9	4,710	3,570	4,400	2,150	2,070	1,900	2.3	2.8	" 2.0
30	208		39.7	4,950	3,500	4,120	2,440	2,320	1,850	2.4	2.1	" 2.0
31	213		42.4		3,720		2,160	2,180		2.5		" 2.0
Sum		16,520.9		37,568.3		126,240		57,270		62,520	9,556.5	76.9
	3,264.7		8,817.4		151,210		78,316					

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	Day	High	Low	Average			Maximum	Minimum	
							Day	Day			Day
Jan.	5.91	3.90	14	235	14	♠ 3.0	105	6,480	8,938	10,600	6,480
Feb.	6.70	* 4.76	10	1,400	4	* 2.8	590	32,800	10,142	32,800	1,900
Mar.	5.75	4.33	1	608	26	25.8	284	17,500	6,822	17,500	2,020
Apr.	9.49	4.40	30	♠ 5,180	1	39.4	1,250	74,500	24,875	74,500	6,360
May	9.77	7.90	20	♠ 6,040	27	♠ 3,460	4,880	300,000	84,700	300,000	12,500
June	8.94	7.87	7	♠ 4,880	13	♠ 3,660	4,210	250,000	62,134	250,000	9,770
July	9.34	6.0	3	♠ 5,080	12	♠ 896	2,530	155,000	42,560	155,000	11,900
Aug.	8.52	6.81	23	3,940	11	899	1,850	114,000	32,944	114,000	6,040
Sept.	8.95	6.25	14	4,430	20	1,090	2,080	124,000	38,066	124,000	3,530
Oct.	6.84	3.83	2	1,920	29	1.6	308	19,000	6,980	19,000	1,970
Nov.	3.88	3.80	10	3.4	30	1.4	2.6	153	4,943	8,700	153
Dec.	3.87	3.78	1	♠ 2.2	8	♠ 1.8	2.0	120	3,460	7,760	120
Yearly	9.77	3.78		6,040		1.4	1,510	1,093,553	326,364	1,093,553	96,740

♠ Estimated * Partly Estimated @ Mean Daily Extreme ♠ Deduced † And other days.
 # The average, maximum, and minimum discharges for January through May are for the period 1939-1942.

OUTFALLS FROM DEEP WELLS

Near El Paso, Texas, and Cd. Juarez, Chihuahua.

Between the Below American Dam Station and the Cd. Juarez Station several outfall ditches or pipe lines discharge water into the Rio Grande, the source of which is from deep wells in the vicinity of El Paso and Cd. Juarez. During 1942 such outfalls contributed a total of 12,194 acre feet of water to the Rio Grande flow, which is equivalent to an average steady flow of 16.8 second feet during the year. Of this total flow 16.5 second feet, or 11,977 acre feet, came from the United States side, while 0.3 second feet, or 217 acre feet, came from the Mexican side. On the remainder of this page will be found details concerning these outfalls.

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 414 acre feet flowed into the river in 1942. This corresponds to an average flow of 0.6 second foot.

Cd. 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 1942, which corresponds to an average flow of 0.3 second foot.

Peyton Packing Company Waste

This outfall enters the river 5.7 miles below the American Dam. From several inspections an average flow of 0.5 second foot, or 362 acre feet is estimated to have entered the river from this source.

El Paso Sewage Outfall

This outfall enters the river 6.6 miles downstream from the American Dam. Prior to 1942 the flow of sewage was usually measured by Venturi meter at the treatment plant which began operating in 1936. During most of 1942 the sewage plant was not operating, pending enlargement. The Department of Water and Sewage of the City of El Paso estimated the outfall to have been as shown below for 1942.

Month	1942		Period 1936-1942
	Mean Second Feet	Acre Feet	Average Acre Feet
January	14.0	862	567
February	15.3	852	560
March	14.1	869	571
April	15.7	936	616
May	15.7	964	634
June	16.9	1,005	662
July	16.9	1,039	683
August	16.0	981	645
September	15.6	926	609
October	15.4	944	621
November	15.2	906	596
December	14.9	917	604
	15.5	11,201	7,368

RIO GRANDE AT JUAREZ STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights located 2.5 miles downstream from El Paso, Texas and Cd. Juarez, 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. The zero of the gage is 3,687.26 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 214 meter measurements during the year, 202 by the Mexican and 12 by the United States Section. Computations by shifting channel methods. 1942 records good. Records available: April 1, 1938 to December 31, 1942.

REMARKS: Reservoirs, irrigation diversions and drainage returns above this station modify the river flow. "The bottom of the river has degraded about 6.9 feet at this station from April 1938 to December 1942."

EXTREME FLOWS: The greatest flow since April 1, 1938, occurred May 18, 1942 with a gage height of 7.87 feet and a flow of 6,600 second feet. The lowest flow since April 1, 1938 occurred February 25, 1940 with a gage height of 3.48 feet and a flow of 16.2 second feet. On November 22, 1942 there was a flow of 38.8 second feet with a gage height of -.62 feet.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
1	209	213	957	731	5,470	4,130	4,980	1,490	2,390	2,340	76.6	198		
2	202	207	791	816	5,260	4,100	5,190	2,230	2,050	2,330	104	120		
3	203	251	869	851	5,900	4,060	5,160	2,280	2,170	1,380	117	168		
4	204	445	893	667	5,440	4,170	4,910	2,030	2,110	1,160	161	133		
5	228	678	865	819	5,580	3,990	3,710	2,060	2,340	1,120	162	105		
6	211	1,030	763	922	5,550	4,730	3,330	2,200	2,810	1,010	261	260		
7	201	975	752	975	5,260	5,400	3,080	1,540	2,240	908	248	101		
8	215	1,110	865	1,200	5,650	5,330	2,870	1,420	1,900	922	206	80.2		
9	230	1,360	869	1,020	5,330	5,090	2,770	1,900	1,850	961	195	73.1		
10	247	1,610	855	653	5,540	4,870	2,720	1,660	1,830	1,025	177	84.0		
11	223	1,100	819	544	5,510	4,730	2,520	1,270	1,940	1,090	114	68.2		
12	214	985	809	883	5,550	4,560	1,110	1,830	2,240	1,060	84.7	107		
13	225	1,020	780	1,020	5,760	4,100	1,320	1,600	2,970	893	71.7	452		
14	226	901	660	925	6,000	4,340	1,570	1,530	3,400	904	64.6	378		
15	217	855	738	1,190	6,040	4,480	1,470	1,620	2,370	855	94.6	352		
16	220	763	812	1,480	5,860	4,940	1,480	2,360	2,480	780	118	360		
17	210	855	710	1,470	6,210	4,590	1,380	2,500	2,500	819	96.8	424		
18	201	897	650	1,520	6,390	4,450	1,360	1,620	2,840	724	56.8	441		
19	216	788	636	1,700	6,320	4,240	2,390	1,640	3,040	473	50.8	583		
20	263	795	604	1,680	6,460	4,560	2,310	1,510	1,850	342	39.9	491		
21	194	756	576	1,520	6,140	4,700	2,680	1,570	2,790	284	21.9	326		
22	210	551	533	2,010	5,720	4,730	2,310	1,490	2,690	247	97.0	406		
23	208	551	590	2,370	4,590	4,520	2,430	1,890	2,530	206	192	463		
24	206	501	470	2,420	4,630	4,560	2,290	2,920	2,620	180	154	438		
25	203	388	480	3,280	4,100	4,840	2,330	3,780	2,870	276	165	381		
26	201	364	791	3,740	3,960	4,560	2,690	2,760	2,720	142	223	353		
27	226	689	763	4,340	3,810	4,590	2,530	2,830	2,350	119	204	322		
28	185	886	653	5,050	3,960	4,940	2,340	2,690	2,200	104	245	313		
29	196	706	706	5,080	3,920	4,700	2,230	2,520	2,190	84.8	310	293		
30	276	932	932	5,330	3,850	4,340	2,300	2,730	2,330	75.2	247	282		
31	219	893	893	4,130	4,130	4,130	2,150	2,530		70.6		273		
Sum	6,689	21,524	23,084	56,206	163,890	137,340	81,910	64,200	72,510	22,884.6	4,358.4	8,828.5		
1942												Period 1938-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet					
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum			
Jan.	3.15	2.66	30	452	11	129	216	13,270	11,252	13,270	9,440			
Feb.	5.05	2.76	10	1,750	5	150	769	42,690	16,160	42,690	4,730			
Mar.	4.13	2.82	29	1,210	#	452	745	45,790	25,882	45,790	14,140			
Apr.	8.01	2.92	29	5,470	11	509	1,870	111,500	50,250	111,500	30,900			
May	3.04	4.89	18	6,600	30	3,510	5,290	325,100	87,490	325,100	23,400			
June	6.23	4.07	7	5,230	5	3,530	4,580	272,400	85,000	272,400	32,140			
July	6.59	0.43	1	6,220	13	604	2,640	162,500	68,308	162,500	42,400			
Aug.	4.59	1.15	25	4,520	1	1,170	2,070	127,300	61,716	127,300	38,700			
Sept.	5.71	1.67	14	5,160	10	1,610	2,420	143,800	58,574	143,800	22,300			
Oct.	2.82	-0.43	2	2,690	30	62.9	738	45,390	21,318	45,390	11,600			
Nov.	0.75	-0.62	29	547	22	38.8	145	8,640	11,330	13,350	8,640			
Dec.	0.69	-0.39	19	579	9	55.8	285	17,510	11,600	17,510	7,510			
Yearly	3.04	-0.62		6,600		38.8	1,820	1,315,890	508,960	1,315,890	269,460			

Various days of the month 0 Deduced 0 Period 1939-1942

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, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 76 meter measurements during the year. 59 by the United States and 17 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available August 17, 1938 to December 31, 1942.

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

EXTREME FLOWS: The greatest flow since August 17, 1938, occurred May 19, 1942, with a gage height of 16.06 feet and a flow of 6,490 second feet. The lowest flow is sometimes zero.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	173	184	886	117	4,380	3,660	4,000	788	2,130	1,790	144	102
2	175	176	529	45.6	4,500	3,340	4,580	1,260	2,070	2,120	147	106
3	193	174	702	168	4,550	3,320	4,270	1,840	*2,080	1,400	97.0	66.6
4	191	264	630	106	4,930	3,530	4,360	1,460	*1,850	1,090	93.3	33.1
5	192	458	597	54.7	4,750	3,530	*3,800	1,610	*2,110	958	134	32.2
6	206	1,090	477	= 140	4,770	4,120	*2,920	1,600	*2,680	863	152	43.1
7	204	821	495	= 218	4,780	4,690	*2,420	*1,110	*1,910	882	184	100
8	182	979	643	= 296	5,000	4,350	2,230	* 776	*1,560	914	185	35.6
9	155	1,240	606	373	5,150	4,150	2,170	1,140	*1,270	844	168	34.6
10	168	1,950	523	96.5	5,430	4,220	2,050	*1,030	*1,290	928	151	35.1
11	166	1,406	530	11.0	5,720	4,300	1,340	696	*1,460	962	150	34.2
12	185	792	488	91.7	5,600	4,200	63.3	1,150	*1,760	960	146	33.4
13	201	795	466	354	5,650	4,350	342	*1,060	*1,910	932	126	62.1
14	224	719	317	221	5,750	4,770	462	* 910	*3,340	895	105	200
15	216	702	355	343	5,550	4,480	621	*1,970	*1,970	866	93.5	186
16	188	638	424	748	5,700	4,320	785	*2,410	*1,670	727	120	191
17	213	657	295	625	5,800	4,240	685	*1,830	*1,830	707	118	236
18	196	679	238	581	6,070	4,190	582	*1,390	*2,000	636	48.2	290
19	150	636	152	978	6,140	4,020	1,700	1,240	*2,850	485	54.4	358
20	152	633	68.6	997	6,040	4,190	1,610	1,120	*1,270	312	50.8	400
21	172	707	33.6	888	6,060	4,640	1,930	1,020	*2,040	306	41.6	370
22	208	506	16.3	1,270	5,600	4,040	1,600	936	2,330	351	39.5	363
23	226	432	27.7	1,860	4,240	3,760	1,740	1,760	2,150	312	38.8	470
24	255	379	= 13.0	2,140	3,630	3,800	1,790	2,300	2,260	284	43.2	440
25	226	343	= 5.0	2,910	3,860	3,820	1,850	3,140	2,220	284	44.9	410
26	201	325	* 138	3,190	3,680	3,770	1,980	2,390	2,330	232	37.7	385
27	161	345	247	3,620	3,650	3,840	1,880	2,380	2,170	147	35.4	356
28	131	635	98.9	4,460	3,600	4,500	1,680	2,560	1,890	96.2	34.5	325
29	148		33.0	4,450	3,450	3,890	1,480	2,540	1,870	59.5	34.4	298
30	146		278	4,200	3,420	3,670	1,450	2,270	1,810	102	127	263
31	164		212		3,530		1,360	2,310		145		255
Sum	5,768	18,665	10,554.1	35,552.5	151,170	121,500	59,730.3	*50,106	60,080	21,589.7	2,942.2	6,514

1942										Period 1938-1942 [⊖]		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum	
	Jan.	12.22	11.55	22	383	19	45.0	186	11,400	9,250	11,400	7,900
Feb.	13.22	11.71	11	2,070	4	88.4	667	37,000	12,065	37,000	2,930	
Mar.	12.71	-	1	1,090	25	= 5.0	340	21,000	6,632	21,000	876	
Apr.	15.92	10.77	28	4,950	2	5.4	1,180	70,500	19,830	70,500	1,190	
May	16.06	11.89	19	6,490	30	2,710	4,880	299,800	77,420	299,800	1,050	
June	13.61	11.90	28	5,480	9	2,900	4,050	241,000	63,858	241,000	1,310	
July	*13.47	8.17	2	*5,200	12	18.2	1,930	118,500	34,108	118,500	4,840	
Aug.	12.57	= 9.48	25	3,720	8	= 521	1,620	* 99,400	35,400	* 99,400	5,500	
Sept.	11.90	9.77	6	3,450	20	774	2,000	119,200	38,152	119,200	1,760	
Oct.	11.20	8.65	2	2,520	29	49.6	696	42,800	11,992	42,800	1,620	
Nov.	9.27	8.42	2	208	27	34.1	98.1	5,840	2,064	5,840	11.5	
Dec.	9.85	8.43	23	550	5	30.9	210	12,900	5,330	12,900	1,050	
Yearly	16.06			6,490		= 5.0	1,490	1,079,340	316,101	1,079,340	43,965.5	

[⊖] Estimated * Partly Estimated
[⊙] The average, maximum, and minimum discharges for January through August are for the period 1939-1942.

RIO GRANDE AT COUNTY LINE STATION

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, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 81 meter measurements during the year, 60 by the United States and 21 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: January 1, 1938 to December 31, 1942.

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

EXTREME FLOWS: The greatest flow since January 1, 1938, occurred May 19, 1942, with a gage height of 8.66 feet and a flow of 6,340 second feet. The lowest flow since January 1, 1938, occurred March 5, 1939 with a gage height of 2.25 feet and a flow of 44.3 second feet.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	347	272	1,130	388	4,820	3,730	3,780	1,430	2,690	2,150	361	408
2	339	285	900	352	4,880	3,290	4,990	1,390	2,510	2,540	351	341
3	353	290	982	408	5,030	3,260	4,710	2,060	2,510	2,090	412	281
4	335	310	1,010	410	5,170	3,390	4,870	1,720	2,330	1,530	412	299
5	349	385	968	376	5,110	3,520	4,230	1,820	2,400	1,340	432	283
6	381	1,180	868	523	5,080	4,090	3,210	1,680	2,810	1,200	446	426
7	345	1,050	879	462	5,060	4,780	2,670	1,400	2,240	1,230	425	494
8	361	1,190	1,020	881	4,980	4,440	2,510	847	1,900	1,210	401	401
9	329	1,250	1,000	788	4,930	4,170	2,370	1,500	1,630	1,150	369	408
10	334	1,620	863	452	4,880	4,310	2,200	1,560	1,550	1,270	384	389
11	349	1,410	781	359	5,530	4,330	2,050	1,240	1,570	1,300	404	356
12	339	1,120	724	370	5,500	4,220	1,810	1,330	1,900	1,260	387	439
13	360	1,110	737	655	5,560	4,310	813	1,410	2,090	1,250	335	535
14	349	978	617	558	5,660	4,640	1,150	1,270	3,380	1,090	314	577
15	321	975	676	506	5,820	4,490	1,040	1,760	2,440	1,090	339	480
16	313	943	831	932	5,840	4,360	1,030	2,350	2,090	1,010	307	571
17	317	982	679	941	6,000	4,180	1,050	2,460	2,280	1,010	292	582
18	342	1,020	528	940	6,180	4,050	987	1,770	2,200	965	286	660
19	340	948	460	1,270	6,160	3,900	1,670	1,720	3,190	784	266	735
20	318	1,010	367	1,320	6,070	3,980	1,790	1,710	2,310	598	246	818
21	316	1,120	329	1,200	6,010	4,710	2,020	1,610	2,200	519	220	696
22	312	938	334	1,320	5,930	4,090	1,850	1,590	2,810	466	215	598
23	305	716	293	1,940	* 4,380	3,590	1,910	2,160	2,570	477	234	* 717
24	310	606	242	2,170	* 3,380	3,710	1,950	2,460	2,660	497	330	* 562
25	302	579	235	2,770	* 3,810	3,730	2,040	3,850	2,620	452	331	508
26	290	521	239	3,120	3,540	3,660	2,550	3,130	2,740	471	300	463
27	290	532	442	3,470	3,500	3,560	2,170	2,940	2,610	435	375	438
28	290	811	270	4,250	3,460	4,450	1,940	3,130	2,280	426	322	395
29	280		284	4,730	3,320	4,100	1,830	2,840	2,180	400	375	386
30	275		402	4,610	3,480	3,630	1,770	3,060	2,120	374	438	* 367
31	270		517		3,580		1,680	2,800		365		368
Sum		24,149		42,471		120,670		61,997		30,949		14,981
	10,071		19,605		152,650		70,640		70,810		10,309	
	1942										Period 1938-1942	
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low	Day			Average	Maximum	Minimum	
Jan.	3.68	2.53	8	953	29	197	325	20,000	15,480	20,000	11,300	
Feb.	4.63	2.57	10	1,670	5	161	862	47,900	18,106	47,900	7,360	
Mar.	4.21	2.54	1	1,220	25	152	622	38,900	15,636	38,900	6,370	
Apr.	7.50	2.60	29	4,850	12	274	1,420	84,200	27,028	84,200	7,870	
May	8.66	6.33	19	6,340	30	2,790	4,920	303,000	70,788	303,000	6,980	
June	7.69	6.20	28	5,120	2	2,930	4,020	239,000	61,624	239,000	6,870	
July	7.78	3.67	5	5,260	13	609	2,280	140,000	46,440	140,000	11,400	
Aug.	7.09	3.64	25	4,420	8	775	2,000	125,000	44,020	125,000	15,500	
Sept.	7.20	4.53	14	4,550	11	1,390	2,360	140,000	52,838	140,000	8,290	
Oct.	6.06	3.40	2	3,010	30	351	998	61,400	26,560	61,400	11,200	
Nov.	3.83	3.17	30	524	23	181	344	20,400	14,466	20,400	8,230	
Dec.	4.21	3.18	14	1,050	3	237	483	29,700	17,214	29,700	8,770	
Yearly	8.66	2.53		6,340		152	1,720	1,247,500	410,200	1,247,500	129,680	

* Estimated * Partly Estimated

RIO GRANDE AT FORT QUITMAN STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights located on the rectified Rio Grande channel 1.5 miles below Old Fort Quitman, and 81.1 river miles below the American Dam at El Paso. The zero of the new gage is 3,450.57 feet, U.S.C. and G.S. datum. See Water Bulletin No. 7 for a gage history of this station.

RECORDS: Based upon 81 meter measurements during the year, 62 by the United States and 19 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: January 1923 to December 1942. Estimates have been carefully made covering the last 54 years when dependable measured records were not available. These estimates and 54 year normals are shown elsewhere in this bulletin.

REMARKS: Reservoirs, diversions and drainage returns above this station completely modify the river flow. **COMPARATIVE FLOWS FROM RECORDS:** **Momentary Peak:** Max., about June 20, 1905, 17,000 sec. ft. This is the greatest flow in the last 114 years. Max. since Jan. 1923, 9,780 sec. ft., June 5, 1941. Min., frequently dry prior to Jan. 1915.** Since Jan. 1923, dry only once, March 30, 1935. **Daily:** Max., about 17,000 sec. ft. June 20, 1905. Since Jan. 1923, 5,890 sec. ft. average on May 19, 1942. Min., frequently dry prior to Jan. 1915. Since Jan. 1923, 0.9 sec. ft. average May 31 to June 4, 1935. **Monthly:** Max., since Jan. 1923, 5,030 sec. ft. average in May 1942. Min., frequently dry prior to Jan. 1915. Since Jan. 1923, 14.3 sec. ft. average in May 1935. **Yearly:** Max., since Jan. 1923, 1,750 sec. ft. average in 1942. Min. since Jan. 1923, 141 sec. ft. in 1934. **Two Successive Years:** Max. since Jan. 1923, 1,106 sec. ft. average 1941 and 1942. Min. 171 sec. ft. average in 1934 and 1935. **Three Successive Years:** Max. since Jan. 1923, 794 sec. ft. average 1940 to 1942. Min. since Jan. 1923, 183 sec. ft. average 1934 to 1936. **Four Successive Years:** Max. since 1923, 648 sec. ft. average 1939 to 1942. Min. since Jan. 1923, 199 sec. ft. average 1934 to 1937. **Five Successive Years:** Max. since Jan. 1923, 595 sec. ft. average 1938 to 1942. Min. since Jan. 1923, 218 sec. ft. average 1933 to 1937. **Twenty Years:** Average 381 sec. ft. See pages 71 and 72 of Water Bulletin No. 8 for the magnitude and average frequency of floods in the period 1828 to 1938.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	320	300	1,090	285	4,650	3,890	3,590	1,350	2,890	2,240	358	413
2	315	300	989	320	4,820	3,650	4,210	1,990	2,900	2,460	381	397
3	330	310	932	370	4,970	3,480	4,460	1,840	2,910	2,120	438	368
4	323	242	1,010	380	5,140	3,500	4,430	1,430	2,660	1,760	447	365
5	327	358	987	374	5,210	3,570	4,580	1,550	2,470	1,630	465	363
6	354	823	868	450	5,280	3,870	3,780	1,570	2,780	1,500	458	395
7	375	1,140	812	460	5,240	4,260	3,230	1,350	2,500	1,440	491	512
8	372	1,160	929	749	5,410	4,170	2,910	851	2,100	1,280	526	440
9	374	1,170	944	785	5,590	4,380	2,760	1,140	*1,730	1,130	487	414
10	346	1,550	870	462	5,720	4,330	2,060	1,590	1,620	1,190	408	414
11	354	1,690	786	354	5,360	4,310	2,070	1,360	1,580	1,280	430	425
12	334	1,190	692	337	5,410	4,260	*1,930	989	1,800	1,340	423	431
13	342	1,120	656	521	5,420	4,200	770	1,550	2,100	1,400	381	437
14	317	1,080	548	560	5,590	4,350	1,070	1,210	3,000	1,110	371	551
15	331	1,100	532	520	5,690	4,580	1,040	1,570	2,870	1,150	365	510
16	333	1,160	749	*1,000	5,740	4,390	1,100	2,420	2,200	1,120	359	573
17	330	1,030	683	925	5,720	4,250	1,170	2,430	2,470	1,090	370	558
18	318	1,120	576	945	5,730	4,090	1,150	2,170	2,250	1,100	388	608
19	320	1,120	519	*3,060	5,890	4,000	1,470	2,060	2,880	990	371	649
20	309	1,050	421	*1,300	5,880	3,910	2,050	*2,060	2,830	760	373	802
21	310	1,110	365	*1,160	5,800	4,140	1,930	*2,030	*2,040	669	384	784
22	319	994	359	*1,910	5,720	4,230	2,070	*2,060	*2,860	393	370	543
23	317	785	371	2,020	5,510	3,830	1,830	*2,660	*2,660	575	395	750
24	310	692	306	1,900	4,620	3,790	1,900	*2,520	2,750	585	406	590
25	309	664	273	2,450	4,220	3,730	1,920	*3,720	2,690	515	409	551
26	311	656	296	2,780	3,880	3,760	2,370	*3,840	2,730	486	357	503
27	312	607	445	3,060	3,610	3,820	2,310	3,090	2,730	460	326	469
28	314	738	*404	3,330	3,610	4,020	1,840	3,290	2,460	443	309	466
29	302		*326	3,720	3,470	4,220	1,680	3,150	2,330	398	331	454
30	297		*482	4,320	3,450	3,840	1,590	3,110	2,300	364	410	461
31	285		*385		3,650		1,550	3,190		358		446
Sum		25,239		*38,806		120,820		*63,812		33,536		15,642
	10,110		19,605		156,000		70,820		74,090		11,977	

Month	1942						Period 1924-1942				
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low			Normal	Maximum	Minimum	
Jan.	4.60	3.73	4	610	21	152	326	20,100	12,417	20,100	5,370
Feb.	5.50	3.76	11	1,780	4	164	901	50,100	14,228	50,100	3,510
Mar.	5.12	3.47	1	1,230	26	226	632	38,900	12,213	38,900	1,090
Apr.	9.69	3.59	22	6,540	1	220	1,290	77,000	16,048	77,000	1,200
May	9.74	6.70	19	5,920	30	3,340	5,030	309,000	31,336	309,000	880
June	8.20	6.65	15	4,660	5	3,410	4,030	240,000	28,296	240,000	3,630
July	8.05	2.37	5	4,700	14	540	2,280	140,000	26,401	140,000	4,300
Aug.	*7.43	2.39	26	*4,530	9	585	2,060	*127,000	35,346	*127,000	4,300
Sept.	6.50	3.66	14	3,730	12	1,430	2,470	147,000	39,415	147,000	6,980
Oct.	*5.45	2.25	2	*2,760	31	331	1,082	66,500	24,778	66,500	4,520
Nov.	2.66	1.95	24	605	19	288	400	27,800	15,922	24,500	4,990
Dec.	3.16	2.03	21	905	5	300	505	31,000	16,670	31,000	5,640
Yearly	9.74	1.95		6,540		152	1,750	1,270,400	273,070	1,270,400	102,420

* Partly Estimated ** Estimated *** Elephant Butte Reservoir closed January 1915.
 * Estimated from peak flow at El Paso and Upper Presidio Stations.

RIO GRANDE AT UPPER PRESIDIO STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights located 7.8 river miles above the confluence of the 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, United States Coast and Geodetic Survey datum.

RECORDS: Based on 56 meter measurements during the year. Computations by shifting channel methods. 1942 records good. Records available: April 1900 to March 1914; September 1919 to March 1920; January 1927 to December 1942. The records formerly published for the period August 1923 to December 1926 were found to be erroneous. Monthly estimates have been carefully made covering all months in the past 54 years when dependable measured records were not available. These estimates, together with 54 year monthly and annual normals, will be found elsewhere in this bulletin.

REMARKS: Reservoirs in the United States, as well as many irrigation diversions and drainage returns in the United States and Mexico, completely modify the river flow.

EXTREME FLOWS: The greatest recorded flow was on June 12, 1912, when peak discharge was 15,200 second feet. The river is sometimes dry. See pages 71 and 72 of Water Bulletin No. 8 for the magnitude and average frequency of floods during the previous periods of record. On May 26, 1942 a gage height of 10.57 feet was reached with a flow of 5,160 second feet. The level of the river water surface at this gage height was 2,590.39 feet above U.S.C. & G.S. mean sea level datum and was the highest level reached during the years 1923 to 1942, inclusive. According to local testimony this is the highest level reached in the past 51 years at least, being even higher than during the peak flow of 15,200 second feet on June 12, 1912. The datum of the gage in 1912 is unknown.

Mean Daily Discharge in Second Feet 1942—Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	387	290	648	286	1,980	3,690	3,500	1,580	3,500	2,320	508	435
2	388	281	661	284	2,020	3,490	3,650	1,550	3,300	2,250	488	425
3	390	282	830	304	2,090	3,560	4,110	1,540	3,330	2,130	476	454
4	377	286	958	353	2,150	3,710	4,110	1,300	3,270	2,150	497	467
5	373	315	879	281	2,270	3,680	4,090	1,460	3,060	2,280	509	432
6	373	308	898	243	2,390	3,770	3,940	1,530	2,910	1,910	503	417
7	369	310	903	224	2,590	3,660	3,950	1,380	2,880	*1,630	548	402
8	371	329	838	233	2,840	3,460	3,990	1,420	2,830	*1,490	558	410
9	371	641	805	241	3,070	3,400	3,960	1,530	2,910	*1,360	561	420
10	373	793	792	300	*3,380	3,450	3,710	1,240	*3,240	*1,260	580	491
11	372	869	852	312	*3,680	3,520	3,150	900	*2,360	*1,190	598	461
12	373	1,020	819	592	*3,980	3,640	2,720	1,240	*1,850	*1,570	561	431
13	365	1,190	772	427	*4,310	3,740	2,520	1,240	*1,700	*1,430	514	432
14	360	1,130	708	315	*4,450	3,720	2,340	1,070	*1,710	1,740	526	423
15	361	997	675	250	*4,510	3,660	2,040	1,540	*1,830	1,640	510	400
16	360	996	656	271	4,480	3,660	1,100	2,260	2,040	1,260	480	395
17	363	963	608	431	4,500	3,710	1,130	1,870	2,390	1,190	442	518
18	360	989	615	425	4,510	3,700	1,050	1,840	2,290	*1,170	436	520
19	359	947	686	762	4,520	3,750	1,020	2,180	2,170	*1,140	422	560
20	354	932	631	798	4,500	3,820	1,020	2,360	2,120	1,120	406	572
21	347	957	572	761	4,550	3,860	1,170	2,390	2,160	1,040	390	595
22	344	923	532	867	4,940	3,800	2,180	2,390	2,430	924	369	646
23	337	959	487	994	4,960	3,710	2,770	2,510	2,290	816	360	716
24	330	944	445	1,050	4,990	3,620	2,410	3,340	2,290	752	351	657
25	327	824	414	1,510	5,060	3,620	1,920	3,410	2,480	693	341	577
26	324	741	411	1,570	5,130	3,670	1,800	3,660	2,560	666	334	702
27	321	679	371	1,620	5,070	3,560	1,770	4,070	2,490	635	352	599
28	314	657	313	1,680	4,960	3,450	1,810	3,860	2,470	594	379	563
29	314		297	1,770	4,730	3,520	2,010	3,520	2,550	564	384	523
30	308		304	1,850	4,260	3,540	1,860	3,520	2,530	521	395	488
31	307		338		3,920		1,670	3,380		525		464
Sum		20,552		20,984		109,140		67,080		*39,940		15,595
	10,972		19,718		120,790		78,470		75,900		13,778	
1942										Period 1924-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day	Low			Normal	Maximum	Minimum	
Jan.	2.11	1.73	3	403	31	298	354	21,800	11,360	21,800	644	
Feb.	4.68	1.70	13	1,270	3	276	734	40,800	12,117	40,800	1,420	
Mar.	3.92	1.68	4	1,010	31	266	636	39,100	10,009	39,100	285	
Apr.	6.58	1.40	30	1,860	15	208	699	41,600	9,154	41,600	0	
May	10.57	6.57	26	5,160	1	1,920	3,900	240,000	24,125	240,000	0	
June	9.39	8.48	6	3,870	9	3,370	3,640	216,000	22,503	216,000	830	
July	9.73	3.15	3	4,420	19	1,010	2,530	156,000	27,071	156,000	13.3	
Aug.	9.15	2.64	27	4,180	11	871	2,160	133,000	39,964	133,000	2,170	
Sept.	* 8.54	* 4.75	1	3,530	13	*1,680	2,530	151,000	43,526	*151,000	3,140	
Oct.	6.58	1.67	1	2,240	31	508	*1,290	* 79,200	33,402	105,000	0	
Nov.	1.74	.76	12	608	26	327	459	27,300	16,174	34,500	0	
Dec.	2.18	.98	23	727	16	387	503	30,900	15,001	30,900	374	
Yearly	10.57	.76		5,160		208	1,630	1,176,700	264,406	1,176,700	54,315	

* Partly Estimated † Estimated

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 on discharge records of the Rio Grande at Upper Presidio and Lower Presidio stations and estimated irrigation diversions and arroyo inflow between these two stations. 1942 records good. Records available: May 1900 through 1913 and May 1932 through 1942. The records for the years 1924 through April 1932 published in Water Bulletin No. 7, and the records published in Water Bulletin No. 6 for the years 1924 through 1926, have been found to be erroneous. The records 1927 through 1935 published in Water Bulletin No. 6 have been found to be correct. Estimates have been carefully made covering all of the past 47 years when dependable measured records were not available. These estimates, together with 47 year normals, will be found elsewhere in this bulletin.

REMARKS: The Boquilla storage reservoir, as well as diversions for irrigation in the Rio Conchos basin greatly modify the river flow. The Collins reservoir with 21,900 acre feet capacity and a maximum surface area of 1,160 acres, located about 10.5 miles downstream from Boquilla Dam, and the Rosetilla reservoir, located about 52.7 miles farther downstream, with a capacity of 15,400 acre feet 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.

EXTREME FLOWS: The greatest recorded flow occurred September 11, 1904, when the estimated peak was 162,000 second feet. See pages 71 and 72 of Water Bulletin No. 8 for the magnitude and average frequency of floods from the Rio Conchos since 1828. The lowest recorded flow was 3.0 second feet which occurred on May 14, 1904. The second lowest recorded flow was 19.0 second feet which occurred on August 18, 1937.

Month	1942						Average Second Feet.	Total Acre Feet	Period 1924-1942		
	Extreme Gage Feet		Extreme Second Feet			Normal			Maximum	Minimum	
	High	Low	Day	High	Low						
											Day
Jan.			5	1,710	31	721	1,000	61,500	62,821	147,000	20,300
Feb.			17	1,280	7	613	786	43,600	52,811	87,700	29,100
Mar.			7	1,100	29	571	778	47,900	46,679	80,800	20,900
Apr.			17	3,200	15	248	406	24,200	37,392	79,700	5,000
May			28	5,090	1	160	502	30,900	46,139	148,000	3,950
June			4	2,200	30	242	857	51,000	50,797	91,900	8,720
July			4	1,280	18	561	833	50,000	93,168	502,000	15,800
Aug.			31	21,500	5	482	6,260	385,000	160,426	601,000	11,300
Sept.			8	56,600	20	7,040	19,700	1,173,000	319,174	1,173,000	10,400
Oct.			1	11,600	31	1,730	3,910	241,000	188,063	798,000	34,600
Nov.			2	3,210	30	1,320	1,830	109,000	68,153	110,000	29,000
Dec.			17	1,870	31	682	1,280	78,400	60,179	97,700	23,800
Yearly				56,600		160	3,170	2,295,500	1,185,802	2,431,850	509,600

RIO GRANDE AT BELOW ELEPHANT BUTTE DAM STATION

The daily discharges from which the following record is taken are from records of the United States Bureau of Reclamation. They differ somewhat from those published in Water Supply Papers of the U.S.G.S.

Month	1915	1916	1917	1918	1919	1920	1921	1922	1923	
Jan.		1,600	95,300	492	922	12,800	2,890	15,300	11,900	
Feb.		44,200	105,000	51,800	22,200	22,700	35,900	35,400	36,400	
Mar.		69,600	109,000	75,900	53,700	64,100	87,000	75,700	54,000	
Apr.	72,800	106,800	102,000	87,700	74,700	89,100	81,200	106,000	103,000	
May	198,600	164,500	124,000	94,300	124,000	114,000	109,000	126,000	123,000	
June	246,800	192,500	138,000	95,200	112,000	114,000	121,000	131,000	131,000	
July	118,400	117,500	191,000	90,400	94,600	120,000	123,000	131,000	130,000	
Aug.	114,100	82,700	114,500	77,500	91,200	112,000	125,000	130,000	105,000	
Sept.	77,200	67,300	110,000	66,900	67,600	105,000	124,000	116,000	79,300	
Oct.	21,200	37,700	110,000	34,100	11,500	54,500	82,900	99,300	45,000	
Nov.	14,100	14,500	51,900	20,400	18,000	36,400	60,900	30,600	12,800	
Dec.	23,500	127,900	52,800	922	3,770	36,600	26,800	35,800	12,700	
Total	886,700	1,026,800	1,304,000	695,614	673,992	879,200	979,590	1,012,200	844,100	
Month	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Jan.	984	4,600	1,800	5,710	11,000	8,830	184	389	301	903
Feb.	57,500	42,500	19,300	34,700	33,900	28,700	31,000	17,600	26,000	32,100
Mar.	65,100	88,700	61,300	62,500	71,400	64,000	72,800	73,000	64,100	71,900
Apr.	124,000	136,000	108,000	115,000	123,000	122,000	116,000	93,900	113,000	111,000
May	195,000	120,000	107,000	128,000	90,100	98,000	101,000	99,900	105,000	108,000
June	147,000	124,000	129,000	127,000	125,000	117,000	113,000	124,000	126,000	101,000
July	121,000	123,000	98,000	137,000	130,000	102,000	117,000	128,000	134,000	127,000
Aug.	161,000	96,100	118,000	121,000	119,000	78,800	125,000	103,000	132,000	133,000
Sept.	93,300	49,500	78,300	86,100	90,700	65,300	77,800	69,500	87,100	90,100
Oct.	34,700	10,300	13,300	33,100	26,800	6,820	17,500	19,900	12,900	17,800
Nov.	21,400	10,300	16,800	17,400	8,470	4,810	10,700	16,700	18,900	13,900
Dec.	22,300	11,500	10,800	13,200	6,380	5,820	10,100	4,800	12,500	20,300
Total	1,003,284	816,520	761,600	880,770	835,750	702,080	792,084	750,689	831,801	827,003
Month	1934	1935	1936	1937	1938	1939	1940	1941	1942	Normal
Jan.	1,490	404	760	789	638	40,100	1,020	54,800	86,500	13,421
Feb.	54,200	8,310	17,600	7,370	28,500	969	1,030	48,600	76,300	34,847
Mar.	71,400	43,200	58,200	49,300	81,900	1,520	23,000	51,500	66,200	64,075
Apr.	108,000	84,400	106,000	114,000	122,000	132,000	117,000	57,200	162,000	106,707
May	162,000	78,500	100,000	98,800	113,000	90,900	97,300	73,100	407,000	125,336
June	120,000	111,000	122,000	111,000	126,000	117,000	123,000	82,000	365,000	135,359
July	132,000	128,000	133,000	137,000	108,000	133,000	128,000	125,000	211,000	127,425
Aug.	134,000	117,000	130,000	142,000	134,000	125,000	114,000	99,200	110,000	115,986
Sept.	72,500	45,900	61,300	72,200	25,000	129,000	57,700	62,300	69,700	78,379
Oct.	506	9,210	6,390	2,310	33,900	50,200	4,690	72,000	72,100	32,158
Nov.	6,480	5,880	6,250	12,000	39,300	884	5,220	158,000	65,500	24,946
Dec.	1,490	5,760	4,350	11,900	68,700	916	29,000	87,300	69,500	25,689
Total	804,066	637,544	746,050	758,009	880,938	825,489	700,960	971,000	1,818,800	884,248

RIO GRANDE AT LOWER PRESIDIO STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car equipped for winch and heavy weights located about 1.70 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, United States Coast and Geodetic Survey sea level datum.

RECORDS: Based on 50 meter measurements during the year. Computations by shifting channel methods. 1942 records good. Records available: May 1900 through March 1914; January 1927 through December 1942. The record published in W.B. 7, page 44, for the period January 1924 through April 1932 was found to be erroneous. Estimates have been carefully made covering all of the past 47 years when dependable measured records were not available. These estimates together with 47 year normals will be found elsewhere in this bulletin.

REMARKS: Station moved to its present location on June 14, 1932. Previously it was located 11.1 miles farther downstream and .4 mile above the Alamo Creek confluence. See Water Bulletin No. 1 for description of the old station. Reservoirs in the United States, also Boquilla, Colina and Rosetilla reservoirs on the Rio Conchos, as well as many irrigation diversions and drainage returns in the United States and Mexico, greatly modify the river flow.

EXTREME FLOWS: The greatest recorded flow occurred in September, 1904, with a peak flow estimated at 162,000+ second feet at the present station. The lowest recorded flow was 3.0 second feet on May 14, 1904. See pages 71 and 72 of Water Bulletin No. 8 for the magnitude and average frequency of floods in the previous 109 years.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,680	1,320	1,280	1,090	2,100	4,380	4,330	2,130	26,500	13,000	2,750	1,820
2	1,650	1,210	1,290	928	2,150	4,270	4,130	2,120	28,000	11,100	3,270	1,740
3	1,660	1,120	1,640	862	2,180	4,500	5,190	2,320	28,200	9,700	3,400	2,100
4	1,790	1,120	1,810	820	2,230	5,390	5,260	1,860	28,600	8,200	3,130	1,940
5	1,850	988	1,740	720	2,290	5,110	4,900	2,010	24,300	7,570	2,950	1,860
6	1,830	1,080	1,630	731	2,400	4,820	4,740	2,700	25,400	6,320	2,940	1,780
7	1,610	957	1,890	714	2,720	4,700	4,560	2,390	43,400	5,490	2,560	1,750
8	1,610	1,030	*1,800	788	2,970	4,490	4,980	2,070	56,600	5,130	2,240	1,730
9	1,450	1,320	*1,710	719	3,320	4,440	*5,040	2,950	57,400	5,090	2,210	1,690
10	1,450	1,580	*1,750	688	3,880	4,370	24,540	2,670	50,400	4,940	2,230	1,870
11	1,510	1,710	*1,850	717	4,190	*4,480	24,080	2,410	31,400	4,750	2,190	1,800
12	1,310	1,750	*1,950	870	4,490	*4,610	23,650	2,780	22,100	7,150	2,050	1,730
13	1,500	1,990	*1,750	752	4,750	*4,820	23,240	2,720	16,300	5,930	2,080	1,920
14	1,260	1,830	*1,600	617	4,960	*5,030	*2,870	2,260	14,300	6,280	2,060	2,090
15	1,110	1,370	*1,510	543	5,060	*4,900	2,610	2,530	12,600	4,950	2,230	2,060
16	1,240	1,830	*1,460	527	5,030	*4,800	1,770	4,540	11,400	*5,230	2,270	2,000
17	1,060	1,980	1,460	1,560	5,050	4,750	1,700	3,980	10,800	24,900	2,020	2,110
18	1,230	1,840	1,520	1,120	5,070	4,440	1,770	6,120	10,200	24,530	2,070	2,040
19	1,190	1,890	*1,340	1,020	3,270	4,310	1,850	8,930	9,950	24,260	2,060	1,720
20	1,230	1,910	1,180	1,050	5,340	4,640	1,790	9,180	10,400	23,960	1,940	1,820
21	1,200	1,790	1,200	*1,090	5,200	4,780	2,150	9,510	10,100	*3,670	1,820	1,900
22	1,100	1,740	1,100	*1,190	5,290	4,730	2,570	9,140	10,700	3,620	2,030	1,890
23	1,170	1,760	1,100	*1,280	5,370	4,450	3,670	14,500	11,500	3,320	2,160	1,720
24	982	1,600	1,080	1,310	5,510	4,130	3,650	17,900	13,400	3,130	2,170	1,660
25	969	1,610	1,080	1,650	5,780	3,960	2,670	20,100	16,300	2,970	2,040	1,500
26	1,170	1,380	1,200	1,750	5,910	3,980	2,560	18,600	17,200	2,890	2,110	1,640
27	1,370	1,430	1,170	*1,870	6,120	3,970	2,610	18,000	18,300	2,800	1,980	1,760
28	1,230	1,420	962	*1,890	6,100	3,790	2,670	17,800	18,600	2,690	2,080	1,530
29	1,310	889	*1,910	3,780	5,790	3,780	2,820	20,200	18,100	2,660	1,750	1,340
30	1,180	932	*1,970	5,090	3,820	2,500	22,400	15,000	2,550	1,830	1,400	1,400
31	1,090	970		4,530		2,230	23,900		2,490		1,210	
Sum	41,991	42,555	*43,843	32,776	136,140	134,640	103,100	260,720	667,350	161,320	68,620	55,120

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	High		Low	Normal			Maximum	Minimum	
	Day	Day	Day	Day	Day						
Jan.	4.05	2.95	5	2,080	25	930	1,350	83,300	74,179	164,000	30,400
Feb.	4.18	2.86	17	2,230	7	920	1,520	84,400	64,926	99,700	33,900
Mar.	3.98	2.90	7	1,990	29	866	*1,410	*87,000	56,658	89,400	21,200
Apr.	4.01	2.46	30	2,050	16	498	1,090	65,000	45,845	84,100	4,460
May	5.99	24.00	28	6,270	1	2,070	4,390	270,000	69,898	270,000	3,660
June	5.82	4.71	4	5,880	28	3,720	4,490	267,000	72,945	267,000	9,250
July	5.66	3.32	4	5,870	17	1,610	3,350	204,000	119,226	564,000	29,900
Aug.	12.93	3.28	31	24,500	4	1,660	8,410	517,000	199,874	675,000	38,000
Sept.	17.57	7.17	8	59,400	20	9,220	22,200	1,324,000	362,705	1,324,000	17,000
Oct.	9.45	3.50	1	14,100	31	2,240	5,200	320,000	221,511	864,000	41,000
Nov.	4.52	2.93	2	3,740	30	1,560	2,290	136,000	84,342	141,000	37,800
Dec.	3.58	2.51	17	2,340	31	1,130	1,780	109,000	75,168	116,000	31,400
Yearly	17.57	2.46		59,400		498	4,790	3,466,700	1,447,277	3,466,700	662,700

* Estimated * Partly Estimated
 † Revised on account of better data after the 1938 flood.

ALAMITO CREEK STATION NEAR PRESIDIO, TEXAS

DESCRIPTION: Water-stage recorder, about 1,800 feet above 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 gage is 2,541.42 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 3 meter measurements during the year by wading and a rating curve, the high points of which are determined by slope-area calculations; also upon numerous estimates by the hydrographer at low flow. Computations by shifting channel methods. 1942 records fair. Records available: January 1, 1932, to December 31, 1942.

REMARKS: The flow of this spring-fed creek is modified by a small irrigation reservoir (San Estaban) 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. The drainage area above this station is 1,504 square miles, all in the United States, 461 square miles of which are above San Estaban Dam and 1,043 square miles below it.

EXTREME FLOWS: The greatest recorded flow occurred July 20, 1937 with a gage height of 5.33 feet and a flow of 9,670 second feet. The lowest recorded flow was .87 second feet on several days in 1932. On June 28, 1941, a gage height of 6.68 feet was recorded with a flow of 9,550 second feet. On October 2, 1932, backwater from the Rio Grande caused a gage height of 8.33 feet. This is the highest recorded gage height.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	3.5	3.0	3.0	3.0	10.0	3.0	3.5	6.0	3.5	4.0	4.0
2	3.5	3.5	3.0	3.0	3.0	6.3	3.0	3.5	13.5	3.5	4.0	4.0
3	3.5	3.5	3.0	3.0	3.0	3.0	7.0	3.5	12.5	3.5	4.0	4.0
4	3.5	3.5	3.0	3.0	3.0	4.86	3.0	3.5	11.5	3.5	4.0	4.0
6	3.5	3.3	3.0	3.0	3.0	7.8	3.0	3.5	35.3	3.5	4.0	4.0
6	3.5	3.0	3.0	3.0	3.0	3.5	3.0	3.5	29.6	3.5	4.0	4.0
7	3.5	3.0	3.0	3.0	3.0	3.5	7.5	3.5	4.61	3.5	4.0	4.0
8	3.5	3.0	3.0	3.0	3.0	3.5	4.07	8.0	4.0	3.5	4.0	4.0
9	3.5	3.0	3.0	3.0	3.0	3.2	28.0	5.0	4.0	3.5	4.0	4.0
10	3.5	3.0	3.0	3.0	3.0	3.0	5.5	3.5	4.0	3.5	4.0	4.0
11	3.5	3.0	3.0	3.0	3.0	3.0	4.0	3.5	4.0	3.5	4.0	4.0
12	3.5	3.0	3.0	3.0	3.0	3.0	5.5	3.0	4.0	152	4.0	4.0
13	3.5	3.0	3.0	3.0	3.0	3.0	12.0	4.0	4.0	14.0	4.0	4.0
14	3.5	3.0	3.0	3.0	3.0	3.0	4.0	56.8	4.0	5.0	4.0	4.0
15	3.5	3.0	3.0	3.0	3.0	3.0	4.0	280	4.0	4.0	4.0	4.0
16	3.5	3.0	3.0	3.0	3.0	3.0	4.0	290	4.0	4.0	4.0	4.0
17	3.5	3.0	3.0	3.0	3.0	3.0	4.0	10.5	4.0	4.0	4.0	4.0
18	3.5	3.0	3.0	3.0	3.0	3.0	5.5	5.0	3.5	4.0	4.0	4.0
19	3.5	3.0	3.0	3.0	3.0	3.0	41.2	20.9	428	4.0	4.0	4.0
20	3.5	3.0	3.0	3.0	3.0	3.0	4.0	46.4	50.0	4.0	4.0	4.4
21	3.5	3.0	3.0	3.0	3.0	3.0	4.0	378	11.0	4.0	4.0	50.6
22	3.5	3.0	3.0	3.0	3.0	3.0	4.96	6.3	140	4.0	4.0	20.6
23	3.5	3.0	3.0	3.0	3.0	3.0	474	5.0	367	4.0	4.0	14.2
24	3.5	3.0	3.0	3.0	3.0	3.0	20.0	5.0	12.5	4.0	4.0	5.0
25	3.5	3.0	3.0	3.0	3.0	3.0	3.0	183	171	4.0	4.0	5.0
26	3.5	3.0	3.0	3.0	3.0	4.0	3.0	19.6	21.0	4.0	4.0	5.0
27	3.5	3.0	3.0	3.0	3.0	3.0	3.0	8.0	4.0	4.0	4.0	5.0
28	3.5	3.0	3.0	3.0	3.0	3.0	3.0	6.6	3.5	4.0	4.0	5.0
29	3.5	3.0	3.0	3.0	3.0	10.5	3.0	28.8	3.5	4.0	4.0	5.0
30	3.5	3.0	3.0	3.0	3.0	4.5	3.0	9.3	3.5	4.0	4.0	5.0
31	3.5	3.0	3.0	3.0	3.0	3.0	3.5	10.0	4.0	4.0	4.0	5.0
Sum	109.1	86.3	93.0	90.0	93.0	599.8	1,573.7	1,420.7	1,827.9	277.5	120	205.8

1942										Period 1932-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low	Normal			Maximum	Minimum		
											Day	
Jan.	3.21	3.17	1	4.1	2	3.5	3.5	216	200	273	123	
Feb.	3.18	3.17	1	3.5	2	3.0	3.1	171	186	234	111	
Mar.	3.22	3.13	22	7.0	30	2.5	3.0	184	199	270	123	
Apr.	3.20	3.13	22	5.0	6	2.8	3.0	179	263	743	119	
May	3.17	3.13	1	3.2	26	2.8	3.0	184	1,767	8,520	184	
June	4.98	3.13	4	2,000	3	3.0	20.0	1,190	2,266	* 6,360	206	
July	5.25	2.81	22	3,250	1	3.0	50.8	3,120	3,137	6,650	249	
Aug.	5.19	2.75	16	2,750	12	3.0	45.8	2,820	4,493	16,330	378	
Sept.	4.88	3.23	7	1,650	18	3.5	60.9	3,630	4,543	19,600	179	
Oct.	4.31	3.42	12	490	1	3.5	9.0	550	2,963	19,200	157	
Nov.	3.44	3.42	1	4.0	1	4.0	4.0	238	289	807	119	
Dec.	3.92	3.42	21	170	1	4.0	6.6	408	238	408	117	
Yearly	5.25	2.75		3,250		2.5	17.8	12,890	20,544	40,444	6,397	

*Partly Estimated † Estimated ‡ And Other Days

TERLINGUA CREEK STATION NEAR TERLINGUA, TEXAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car located about 12 miles south of Terlingua, Texas, 2.4 miles above the confluence with the Rio Grande at the lower end of Santa Helena Canyon. This recorder was moved 310 feet downstream December 28, 1939. Zero of gage is 2,192.01+ .5 feet above mean sea level datum, United States Geological Survey datum. This creek enters the Rio Grande 371.6 river miles below the American Dam at El Paso, Texas.

RECORDS: Based upon 4 meter measurements and numerous estimates by hydrographer at low flow, and the rating curve, the higher points of which were determined by slope-area calculations. Computations by shifting channel methods. 1942 records fair. Records available: January 1, 1932 to December 31, 1942.

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.

EXTREME FLOWS: The greatest recorded flow was on May 24, 1935, when the extreme gage height was 17.59 feet, with a discharge of 34,900 second feet. The lowest flow recorded was on January 27 and February 3, 1935, and June 17, 1939, when the discharge was .20 of a second foot.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	1.5	1.5	1.0	1.0	154	4.0	33.7	" 30.0	3.0	3.0	2.5
2	1.5	1.5	1.5	1.0	1.0	5.4	4.0	52.3	3.0	3.0	3.0	2.5
3	1.5	1.5	1.5	1.0	1.0	5.0	4.0	125	3.0	3.0	3.0	2.5
4	1.5	1.5	1.4	1.0	1.0	136	4.0	3.0	" 20.0	3.0	3.0	2.5
5	1.5	1.5	1.4	1.0	1.0	70.2	4.0	2.9	3.0	3.0	3.0	2.5
6	1.5	1.5	1.4	1.0	1.0	5.0	4.0	2.9	3.0	3.0	3.0	2.5
7	1.5	1.5	1.4	1.0	1.0	5.0	4.0	33.8	3.0	3.0	3.0	2.5
8	1.5	1.5	1.3	1.0	1.0	75.9	4.0	20.5	3.0	3.0	3.0	2.5
9	1.5	1.5	1.3	1.0	1.0	13.5	4.0	32.7	3.0	3.0	3.0	2.5
10	1.5	1.5	1.3	1.0	1.0	5.0	4.0	3.0	3.0	3.0	3.0	2.5
11	1.5	1.5	1.3	1.0	1.0	5.0	94.4	3.0	3.0	3.0	2.5	2.5
12	1.5	1.5	1.2	1.0	1.0	5.0	38.0	3.0	3.0	23.9	2.5	2.5
13	1.5	1.5	1.2	1.0	1.0	5.0	36.7	3.0	21.2	30.1	2.5	2.5
14	1.5	1.5	1.2	1.0	1.0	48.2	28.0	36.2	19.0	11.6	2.5	2.5
15	1.5	1.5	1.2	1.0	1.0	67.8	4.0	67.4	15.0	7.2	2.5	2.5
16	1.5	1.5	1.1	32.2	1.0	5.0	4.0	" 73.6	13.2	5.6	2.5	2.5
17	1.5	1.5	1.1	" 4.0	1.0	5.0	4.0	" 50.0	12.5	3.0	2.5	2.5
18	1.5	1.5	1.1	1.0	1.0	5.0	4.0	" 60.0	26.7	3.0	2.5	2.5
19	1.5	1.5	1.1	1.0	1.0	5.0	15.7	3.0	612	3.0	2.5	2.5
20	1.5	1.5	1.0	1.0	1.0	5.0	4.0	3.0	240	3.0	2.5	2.5
21	1.5	1.5	1.0	1.0	1.0	5.0	3.0	3.0	60.0	3.0	2.5	61.3
22	1.5	1.5	1.0	1.0	1.0	5.0	252	" 60.0	24.7	3.0	2.5	62.0
23	1.5	1.5	1.0	1.0	71.6	5.0	236	3.0	77.5	3.0	2.5	15.5
24	1.5	1.5	1.0	1.0	4.0	5.0	5.0	3.0	75.4	3.0	2.5	8.0
25	1.5	1.5	1.0	1.0	4.0	5.0	3.0	3.0	30.0	3.0	2.5	5.4
26	1.5	1.5	1.0	1.0	3.0	5.0	3.0	3.0	19.0	3.0	2.5	4.6
27	1.5	1.5	1.0	1.0	3.0	5.0	3.0	3.0	8.5	3.0	2.5	4.6
28	1.5	1.5	1.0	1.0	2.0	5.0	3.0	3.0	3.0	3.0	2.5	4.6
29	1.5	1.5	1.0	1.0	2.0	5.0	2.9	3.0	3.0	3.0	2.5	4.6
30	1.5	1.5	1.0	1.0	2.0	5.0	2.9	3.0	3.0	3.0	2.5	4.4
31	1.5	1.5	1.0	1.0	2.0	5.0	2.9	3.0	3.0	3.0	2.5	3.8
Sum	46.5	42.0	36.5	64.2	115.6	681.0	789.5	702.0	1,343.7	156.4	80.0	228.8

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1932-1942 Acre Feet		
	High	Low	High		Low	Normal			Maximum	Minimum	
			Day		Day						
Jan.	.49	.08	‡ 1	1.5	‡24	1.5	92.2	196	743	82.7	
Feb.	.14	.02	‡11	1.5	‡25	1.5	83.3	126	223	73.4	
Mar.	.14	.11	‡ 1	1.5	‡20	1.0	1.2	72.4	184	489	72.4
Apr.	3.53	.06	16	630	‡ 1	1.0	2.1	127	1,689	15,500	55.1
May	2.83	.06	23	400	‡ 1	1.0	3.7	229	7,039	* 26,000	117
June	3.75	.40	14	720	‡ 3	5.0	22.7	1,350	10,431	54,800	407
July	3.55	-.03	22	640	‡29	2.9	25.5	1,570	6,981	26,800	621
Aug.	4.91	.09	16	1,350	‡5	2.9	22.6	1,390	5,238	* 26,680	254
Sept.	4.92	.09	19	1,400	‡ 2	3.0	44.8	2,670	8,914	24,600	223
Oct.	1.82	" .09	12	1,300	‡ 1	3.0	5.0	310	2,850	8,100	50.8
Nov.	.64	.58	19	34.5	‡11	2.5	2.7	159	502	" 2,980	64.9
Dec.	2.30	.58	21	260	‡ 1	2.5	7.4	454	449	3,080	90.0
Yearly	4.92	-.03		1,400		1.0	11.8	8,506.9	44,599	105,807	6,470.2

* Partly Estimated † Estimated ‡ And Other Days

RIO GRANDE AT JOHNSON RANCH STATION

DESCRIPTION: Water-stage recorder and cable with stand-up cable car, with winch, located about 2 miles above Johnson Ranch, about 14 miles below Castolon, Brewster County, Texas and Santa Helena Ranch, Chihuahua, Mexico, and 392.9 river miles below the American Dam at El Paso, Texas. Zero of the gage is 2,046.00 feet above mean sea level, United States Geological Survey datum.

RECORDS: Based upon 17 meter measurements during the year. Computations by shifting channel methods. 1942 records fair. Records available: April 1936 to December 1942.

REMARKS: The river flow at this station is greatly modified by many irrigation diversions and drainage returns and by large reservoirs in the United States and Mexico.

EXTREME FLOWS: From high water marks it was determined that a stage of 24.6 feet was reached October 3, 1932; the estimated discharge for this stage was 97,000 second feet. The lowest flow to pass this station since records began was 23.1 second feet on June 6, 1938.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,470	1,080	1,300	827	1,750	4,680	3,460	2,100	21,900	14,600	2,380	*1,820
2	1,590	1,100	1,180	946	1,900	4,140	3,470	2,000	23,800	12,600	2,620	*1,780
3	1,620	1,220	1,150	885	2,150	3,890	3,740	2,450	26,300	10,500	3,230	*1,750
4	1,620	1,070	1,340	849	2,150	4,475	4,340	2,190	28,700	9,010	3,440	*1,900
5	1,700	1,070	1,660	798	2,110	5,360	4,410	1,680	28,700	7,920	3,170	*1,850
6	1,810	990	1,580	773	2,140	4,470	4,420	1,570	27,300	7,410	2,940	*1,820
7	1,780	978	1,400	703	2,150	4,450	4,310	2,320	29,900	6,040	2,880	*1,780
8	1,610	974	1,580	694	2,360	4,420	4,340	2,320	37,100	5,740	2,540	*1,770
9	1,590	921	1,550	693	2,610	4,410	4,700	2,480	49,200	5,210	2,200	*1,810
10	1,450	1,100	1,510	731	2,920	4,240	4,700	2,480	56,900	5,000	2,160	*1,790
11	1,440	1,360	1,660	662	3,570	4,110	4,430	2,450	53,000	4,800	2,190	*1,770
12	1,450	1,570	1,760	632	3,830	4,140	3,700	2,200	38,900	6,140	2,160	*1,740
13	1,410	1,550	1,850	714	4,040	4,280	3,880	2,440	28,900	6,900	2,060	*1,660
14	1,410	1,870	1,680	752	4,190	4,400	*3,160	2,410	21,100	5,660	2,090	1,770
15	*1,300	1,840	1,530	674	4,340	4,730	*2,800	2,890	17,600	5,900	2,070	1,960
16	*1,210	1,340	1,470	593	4,450	4,630	*2,720	6,510	15,200	5,420	2,140	*1,940
17	*1,170	1,970	1,490	958	4,510	4,450	*2,340	6,810	13,400	4,870	2,160	*1,910
18	*1,140	1,970	1,300	1,100	4,580	4,410	*1,940	5,480	12,300	4,650	1,990	*1,900
19	*1,200	1,950	1,390	916	4,600	4,280	*1,760	6,880	13,400	4,380	1,980	*1,880
20	*1,230	1,860	1,230	772	4,600	4,140	*2,130	7,510	13,200	4,060	1,940	*1,860
21	1,140	1,930	1,150	943	4,840	4,240	*1,900	8,880	11,000	3,860	1,840	*1,820
22	1,270	1,900	1,090	918	4,710	4,250	*2,480	10,400	10,400	3,650	1,730	*1,810
23	1,090	1,700	1,090	886	5,150	4,170	3,680	10,300	11,100	3,550	1,850	*2,590
24	1,200	1,780	1,010	986	5,160	3,960	3,680	13,700	12,400	3,250	1,990	*2,020
25	1,060	1,590	1,030	1,040	5,100	3,720	*3,310	23,600	14,800	3,050	2,050	*1,750
26	1,010	1,570	973	1,310	5,220	3,700	*2,550	22,100	17,000	2,890	1,970	*1,600
27	1,070	1,300	1,060	1,510	5,230	3,740	*2,500	17,600	18,200	2,810	2,040	*1,450
28	1,220	1,220	1,060	1,540	5,420	3,660	*2,550	15,000	19,000	2,750	*1,960	*1,540
29	1,270		960	1,590	5,320	3,530	*2,500	16,900	19,300	2,640	2,050	*1,670
30	1,170		838	1,630	5,180	3,490	*2,600	18,100	18,000	2,540	*1,830	*1,450
31	1,270		812		4,630		*2,400	20,100		2,470		*1,300
Sum	41,970	40,773	40,683	28,025	121,170	126,565	*100,830	244,330	708,000	170,000	67,650	*55,460

Month	1942						Period 1924-1942				
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low			Normal	Maximum	Minimum	
Jan.	2.93	2.20	6	1,830	26	1,010	1,350	83,200	72,960	83,200	35,900
Feb.	3.19	2.08	18	2,160	9	877	1,460	80,900	60,411	80,900	39,400
Mar.	3.09	1.97	13	1,960	31	804	1,310	80,700	54,466	80,700	31,100
Apr.	3.56	1.62	17	2,580	18	530	934	55,600	42,039	79,300	8,990
May	5.64	2.91	23	6,200	1	1,650	3,910	240,000	76,055	240,000	19,900
June	6.15	4.18	4	7,670	30	3,440	4,220	251,000	84,063	251,000	17,700
July	5.69	*3.05	13	6,280	19	*1,690	*3,250	*200,000	124,694	620,000	43,900
Aug.	12.92	2.71	25	28,200	6	1,420	7,880	485,000	201,272	485,000	52,100
Sept.	19.65	*7.39	10	57,700	22	10,300	23,600	1,404,000	380,379	1,404,000	*59,800
Oct.	9.49	3.44	1	16,100	31	2,240	5,480	337,000	230,302	929,000	*75,600
Nov.	4.36	2.97	3	3,670	23	1,650	2,260	134,000	82,779	164,000	40,500
Dec.	*3.75	*2.50	23	2,780	31	1,210	*1,790	*110,000	72,325	*110,000	29,600
Yearly	19.65	1.62		57,700		530	4,780	5,461,400	1,481,745	3,461,400	610,000

‡ Estimated * Partly Estimated † The monthly maximums and minimums are for the period 1936 to 1942 only. ‡ The monthly normals and the yearly normal, maximum and minimum from January 1924 to March 1936, included in above table were estimated from Boquillas and Lower Presidio.

RIO GRANDE AT LANGTRY STATION, TEXAS

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch, located at Langtry, Texas, 79.5 miles above Villa Ahuñá, Coahuila and 64.1 river miles below the American Dam at El Paso, Texas. Zero of gage is 1,091.69 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 33 meter measurements during the year, 31 by the United States Section and 2 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: May 1900 to October 1914; December 1919 to March 1920; and January 1924 to December 1942.

REMARKS: Large reservoirs and many irrigation diversions, and drainage returns in the United States and Mexico, greatly modify the river flow.

EXTREME FLOWS: The highest recorded gage height was on June 18, 1922, when the extreme gage height was 56.9 feet; the estimated discharge for this stage from extension of the rating curve was 204,000 second feet. The lowest flow ever recorded was in May 1904, with an extreme of 270 second feet. On pages 75 and 76 of Water Bulletin No. 9 will be found a record of flood occurrences since 1864 at this station.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,020	1,600	1,900	1,280	1,950	5,670	4,500	*2,710	18,500	20,300	3,040	2,460
2	2,000	1,630	1,690	1,200	2,020	5,120	4,110	*2,660	20,900	17,200	3,050	2,330
3	1,880	1,580	1,690	1,180	2,090	5,320	4,090	*2,590	22,500	14,700	2,980	2,200
4	1,790	1,480	1,720	1,180	2,200	4,680	4,130	*3,800	25,900	12,500	3,080	2,210
5	1,990	1,580	1,610	1,270	2,370	4,760	5,350	*2,680	27,300	10,800	3,670	2,160
6	1,970	1,580	1,610	1,240	2,600	6,580	5,250	*2,550	28,800	9,450	3,970	2,160
7	2,000	1,470	1,900	1,250	2,510	6,040	4,900	*2,310	29,200	8,540	3,750	2,250
8	2,100	1,460	2,060	1,150	2,540	5,260	4,890	*2,360	28,000	8,070	3,560	2,210
9	2,100	1,320	1,950	1,080	2,610	5,350	4,760	*2,320	31,000	6,960	3,440	2,200
10	1,990	1,390	1,900	1,040	2,730	5,460	4,890	2,690	36,900	6,370	3,250	2,130
11	1,870	1,360	2,050	1,020	3,020	5,080	4,940	2,690	48,000	6,160	2,840	2,080
12	1,870	1,350	1,980	1,010	3,290	4,790	5,440	3,250	37,200	6,150	2,750	2,070
13	1,770	1,510	1,950	1,050	3,960	4,720	4,150	2,850	52,500	6,570	2,750	2,050
14	1,780	1,760	2,180	990	4,280	4,740	3,550	2,740	32,400	7,820	2,730	2,160
15	1,840	1,950	2,220	947	4,500	5,630	4,180	2,760	22,300	7,230	2,670	2,090
16	1,670	1,990	2,250	984	4,780	6,400	3,550	5,430	18,100	6,560	2,660	2,050
17	1,820	2,180	1,980	1,150	4,960	*5,360	3,130	9,850	15,400	6,980	2,600	2,270
18	1,630	2,110	1,880	1,020	5,190	*5,320	2,980	11,600	13,900	6,160	2,610	2,330
19	1,500	2,210	1,860	1,320	6,230	5,080	2,480	7,110	14,100	5,590	2,700	2,340
20	1,480	2,140	1,820	1,250	5,180	5,270	2,190	6,940	12,600	5,410	2,570	2,350
21	1,400	2,270	1,700	1,310	5,260	*4,640	2,100	8,070	14,900	5,160	2,460	2,460
22	1,590	2,160	1,680	1,270	5,430	*4,550	2,400	9,400	12,000	4,860	2,420	2,290
23	1,610	2,220	1,590	1,150	5,510	*4,690	2,260	17,600	11,700	4,580	2,310	2,090
24	1,610	2,250	1,490	1,270	6,070	*4,720	2,750	13,100	12,400	4,330	2,250	2,600
25	1,630	2,110	1,460	1,290	7,020	4,720	4,080	12,500	13,700	4,140	2,230	2,390
26	1,520	2,090	1,420	1,250	5,880	4,430	*3,700	18,200	15,000	3,780	2,420	2,270
27	1,570	2,050	1,350	1,390	5,870	4,210	*3,220	25,200	17,100	3,550	2,510	2,060
28	1,450	1,910	1,340	1,430	6,080	4,120	*2,680	20,300	18,400	3,360	2,400	2,000
29	1,400	1,300	1,300	1,720	6,160	4,110	*2,480	17,200	19,800	3,290	2,480	1,890
30	1,500	1,400	1,400	1,920	6,310	4,060	*2,590	15,600	20,200	3,220	2,420	1,990
31	1,650	1,380	1,380		6,120		*2,480	21,200		3,080		2,090
Sum		50,670		36,571		150,880		260,060		222,870		68,240
	54,000		54,310		134,720		114,180		710,700		84,570	
1942												
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1924-1942			
	High	Low	Day	High	Low	Normal			Maximum	Minimum		
Jan.	2.23	1.44	9	2,170	29	1,400	1,740	107,000	98,936	*245,000	52,300	
Feb.	2.29	1.39	21	2,320	12	1,340	1,810	101,000	83,545	*117,000	48,900	
Mar.	2.25	1.34	16	2,300	29	1,290	1,750	108,000	79,848	118,000	48,100	
Apr.	1.97	1.00	30	1,930	15	939	1,220	72,500	66,768	105,000	30,100	
May	5.71	1.95	18	8,700	1	1,920	4,350	267,000	114,261	271,000	32,300	
June	5.17	3.30	6	7,760	30	4,020	5,030	299,000	113,583	299,000	37,310	
July	5.28	2.09	1	7,910	21	2,060	3,680	226,000	161,054	719,000	56,100	
Aug.	14.56	2.38	23	28,000	9	2,320	8,590	516,000	242,153	*730,000	78,100	
Sept.	24.93	7.02	12	58,900	23	11,300	23,700	1,410,000	436,919	1,410,000	35,700	
Oct.	11.25	2.76	1	20,600	31	2,950	7,190	442,000	280,791	1,063,000	55,200	
Nov.	3.36	2.12	6	4,040	24	2,160	2,820	168,000	111,078	*211,000	56,600	
Dec.	2.56	1.86	24	2,710	29	1,850	2,200	135,000	97,276	135,000	49,800	
Yearly	24.93	1.00		58,900		939	5,320	3,851,500	1,886,212	3,851,500	879,000	

* Estimated * Partly Estimated

PECOS RIVER STATION 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, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 12 meter measurements during the year. Water stage recorder installed May 11, 1942. Prior to this date the staff gage was read twice daily and more frequently during large changes of stage. Computations by shifting channel methods. 1942 records good. Records available: March 17, 1898 to December 3, 1898, and May 1900 to December 31, 1942.

REMARKS: The river flow is completely modified at this station by many irrigation diversions and drainage returns, and by the reservoirs of the Carlsbad irrigation project in New Mexico, and the Red Bluff reservoir in Texas. For dry weather losses and gains in the Pecos river channel from Sheffield to the Rio Grande, see page 47, Water Bulletin No. 11.

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. On pages 75 and 76 of Water Bulletin No. 9 will be found a record of flood occurrences since 1899 at this station.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,420	999	936	536	386	938	313	274	1,050	792	723	882
2	1,380	929	929	496	397	966	485	271	789	739	705	862
3	1,360	897	835	486	398	1,010	313	264	692	728	664	857
4	1,320	1,060	780	471	399	1,060	406	265	1,550	700	657	846
5	1,300	989	739	466	552	1,120	706	265	735	723	647	815
6	1,280	1,080	681	471	672	1,020	911	263	642	672	648	785
7	1,260	1,090	648	601	754	837	323	263	611	676	644	778
8	1,230	1,100	636	498	779	740	315	267	632	697	633	772
9	1,210	1,120	656	450	710	649	312	279	767	713	629	765
10	1,200	1,220	665	455	649	594	309	290	809	735	619	771
11	1,200	1,290	686	432	748	566	283	291	942	752	697	776
12	1,190	1,220	653	413	921	530	306	300	1,100	733	1,030	806
13	1,200	1,190	662	422	981	509	299	304	1,200	726	1,190	829
14	1,200	1,200	683	417	942	493	312	297	1,180	754	1,250	834
15	1,250	1,200	677	412	874	734	309	306	1,010	800	1,340	834
16	1,240	1,240	659	412	813	490	294	377	904	1,190	1,420	827
17	1,250	1,300	669	415	749	464	286	1,070	794	1,450	1,470	821
18	1,340	1,290	656	415	760	435	281	768	730	1,310	1,430	814
19	1,440	1,260	655	499	2,870	415	278	587	876	1,040	1,250	802
20	1,580	1,230	622	405	779	395	278	444	1,000	855	1,260	807
21	1,450	1,200	626	396	599	385	283	403	691	806	1,300	855
22	1,440	1,140	572	396	553	370	280	679	647	793	1,280	836
23	1,370	1,080	614	413	524	360	277	419	744	768	1,220	823
24	1,330	1,060	597	422	512	350	298	4,040	1,230	767	1,120	811
25	1,290	1,040	585	390	494	335	310	2,780	1,300	760	1,050	798
26	1,260	1,000	568	394	476	338	307	855	1,310	748	1,010	840
27	1,210	1,010	562	394	464	336	292	709	1,330	741	948	839
28	1,110	962	561	402	513	330	281	606	1,220	739	937	827
29	1,060		559	393	729	320	278	544	992	744	918	814
30	1,010		563	* 380	842	315	279	1,040	863	737	893	814
31	1,030		568		905		278	2,560		724		813
Sum	39,410	31,396	20,502	13,152	22,744	17,404	10,482	22,080	28,300	25,112	29,582	25,353

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	High		Low	Normal			Maximum	Minimum	
			Day	Day							
Jan.	2.64	1.80	20	1,630	30	1,000	1,270	78,200	25,708	78,200	12,900
Feb.	2.24	1.62	11	1,320	3	891	1,120	62,300	20,564	62,300	10,900
Mar.	1.70	1.09	1	936	27	557	661	40,700	19,348	40,700	11,100
Apr.	1.46	.74	8	752	30	376	438	26,100	17,974	42,400	9,520
May	5.10	.76	19	4,290	1	386	734	45,100	40,083	156,000	10,800
June	2.25	.60	15	1,300	30	315	580	34,500	41,602	197,000	13,300
July	3.35	.49	5	2,670	29	278	338	20,800	25,417	84,200	7,620
Aug.	8.25	.43	24	9,460	6	263	712	43,800	22,054	50,400	7,620
Sept.	4.44	1.15	4	3,460	7	601	943	56,100	51,543	324,420	6,190
Oct.	4.93	1.25	17	4,070	6	661	810	49,800	60,488	486,000	9,520
Nov.	2.50	1.21	17	1,490	10	613	986	58,700	33,931	209,000	10,300
Dec.	1.65	1.45	21	881	9	765	818	50,300	27,097	91,800	12,200
Yearly	8.25	.43		9,460		263	782	566,400	385,809	1,330,900	176,780

* Partly Estimated.

GOODENOUGH SPRING STATION NEAR COMSTOCK, TEXAS

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 971.9 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 10 meter measurements during the year. Computations by shifting channel methods. 1942 records good. Records available: February 23, 1929 to December 1942. Annual discharges for the years 1924 to 1928, inclusive, were estimated as were the monthly discharges for January and February 1929. See page 52, Water Bulletin No. 6.

REMARKS: The flow of this spring channel is very uniform and is not modified by diversions or storage. When the Rio Grande reaches a flow of about 35,000 second feet near this station, then backwater from the Rio Grande reaches this gaging station.

EXTREME FLOWS: The highest recorded gage height was on September 18, 1941, when the extreme gage height was 4.57 feet, discharge 846 second feet. The lowest flow ever recorded was on April 4, 1930 when the extreme flow was 89.4 second feet, with a gage height of 0.30 feet. Backwater from the Rio Grande reached a gage height of 13.86 on September 4, 1935, and 17.30 on September 1, 1932.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	166	154	140	136	136	129	118	113	121	131	122	117
2	165	154	140	136	135	129	115	113	126	131	122	116
3	164	154	141	136	133	129	119	111	128	131	120	116
4	164	154	141	136	131	129	120	111	126	128	122	114
5	163	154	139	136	131	133	121	110	128	132	121	115
6	163	153	141	137	131	130	121	111	129	123	121	113
7	162	152	141	136	130	131	121	111	132	123	121	113
8	162	152	141	136	130	131	121	110	130	123	121	112
9	161	146	142	135	129	133	122	110	131	123	121	112
10	160	151	142	135	128	122	122	110	130	124	118	112
11	160	152	143	134	128	122	120	110	130	124	118	111
12	160	152	143	135	127	123	120	110	129	124	119	110
13	160	151	142	135	126	123	120	109	129	125	120	110
14	160	151	143	134	125	123	120	109	129	125	120	111
15	160	150	143	132	125	123	120	109	129	126	122	111
16	160	149	142	131	126	123	120	110	129	124	122	109
17	160	148	142	132	126	122	119	109	128	124	120	110
18	159	146	142	133	127	121	117	110	129	123	120	110
19	158	146	142	133	132	121	117	112	127	123	121	110
20	157	146	142	131	126	120	116	112	131	122	120	109
21	157	145	139	129	128	119	116	113	133	123	118	112
22	157	145	139	130	129	118	116	113	133	125	118	110
23	156	144	140	134	129	118	117	114	134	123	118	110
24	156	140	141	130	129	118	118	114	133	123	119	110
25	156	140	141	131	133	118	116	114	133	124	119	110
26	155	139	139	132	133	118	115	113	132	121	116	110
27	155	139	137	138	133	117	115	114	131	123	118	107
28	155	140	137	140	131	116	115	115	131	123	119	108
29	155	137	140	130	115	115	115	114	130	124	116	108
30	155	136	138	130	115	113	118	118	131	122	117	108
31	154	136	136	129	129	113	113	122	121	121	117	108
Sum	4,935	4,147	4,354	4,031	4,016	3,689	3,658	3,474	3,892	3,861	3,589	3,442

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1924-1942		
	High	Low	High		Low				Normal	Maximum	Minimum
	Day	Day	Day	Day	Day	Day					
Jan.	1.10	.95	2	167	31	152	159	9,790	8,939	19,620	6,380
Feb.	.99	.85	5	155	27	137	148	8,230	7,968	17,030	5,780
Mar.	.88	.77	1	140	30	136	140	8,640	8,432	17,770	6,210
Apr.	1.23	.72	23	169	21	129	134	8,000	7,943	16,580	5,850
May	2.41	.70	19	273	15	123	130	7,970	8,572	16,840	6,950
June	1.69	.78	10	200	30	114	123	7,320	8,680	16,040	7,020
July	1.23	.81	1	154	31	112	118	7,260	8,975	16,460	7,170
Aug.	1.42	.80	31	157	14	108	112	6,890	8,751	15,840	6,890
Sept.	1.44	1.02	3	158	1	120	130	7,720	11,468	241,490	6,550
Oct.	2.23	.93	5	244	31	121	125	7,660	10,169	25,870	6,840
Nov.	1.01	.83	1	124	29	115	120	7,120	9,367	21,850	6,600
Dec.	.91	.63	21	128	27	107	111	6,830	9,202	20,470	6,660
Yearly	2.41	.63		273		107	129	93,430	108,446	192,840	85,000

* Estimated *Partly Estimated @ Due to backwater from Rio Grande reached a gage height of 3.99 on September 13th. † Maximum and Minimum figures are for the period 1929 to 1942 only. ‡ And Other Days.

DEVILS RIVER STATION 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, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 12 meter measurements during the year. Computations by shifting channel methods. 1942 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, 1942, at highway river 2 miles upstream from railroad bridge.

REMARKS: The monthly flow of this spring-fed river is not modified, but the daily flow is modified by 2 power dams, the operation of which began in 1929. There are irrigation diversions for only 8 acres from this river.

EXTREME FLOWS: The highest recorded gage height was on September 1, 1932, when the extreme gage height was 41.0 feet at present station and the extreme flow was 597,000 second feet. (See Special Flood Report 1932 by United States Section of this Commission.) This corresponds to a flow of 147 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. On pages 75 and 76 of Water Bulletin No. 9 will be found a record of flood occurrences since 1832 at this station.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	294	277	312	280	257	230	281	323	2,020	379	455	466
2	314	301	291	281	278	224	290	346	904	432	349	456
3	323	314	284	278	285	273	279	337	786	1,550	439	363
4	331	311	285	296	290	231	341	349	693	573	362	431
5	345	319	290	269	289	254	345	353	721	341	474	569
6	310	326	299	564	269	277	408	353	699	494	11,900	466
7	326	291	329	560	279	270	402	352	1,050	325	5,020	380
8	323	267	281	338	303	265	334	363	825	358	539	500
9	314	286	271	311	226	253	340	360	662	364	632	447
10	329	304	266	342	288	244	346	363	659	359	606	456
11	323	317	287	304	264	250	345	358	692	361	557	429
12	313	321	280	314	240	243	326	325	676	363	546	411
13	273	285	285	308	248	248	329	358	661	372	546	387
14	357	324	292	338	307	222	338	340	646	330	534	388
15	376	297	272	297	295	241	315	336	624	1,270	477	390
16	360	326	306	280	244	246	307	1,040	451	672	477	410
17	357	296	295	319	247	253	347	921	598	690	477	377
18	352	327	267	303	476	256	350	761	462	8,500	466	259
19	317	275	266	311	* 594	254	330	487	546	5,060	466	413
20	311	299	284	307	= 453	255	338	498	531	1,340	460	399
21	316	275	279	308	* 271	252	370	509	478	* 740	534	453
22	299	301	280	278	271	276	369	480	405	609	395	436
23	269	314	277	318	244	235	345	420	480	582	500	399
24	323	285	274	342	243	265	343	505	485	571	466	419
25	350	277	272	329	223	280	345	440	360	540	456	312
26	322	304	276	326	287	276	353	428	526	474	456	453
27	293	274	256	276	280	270	351	415	351	439	303	442
28	284	286	246	293	279	240	343	438	349	439	557	335
29	289		263	292	250	247	349	407	467	380	466	406
30	317		287	299	234	253	352	1,240	346	499	466	369
31	294		301		232		317	5,180		363		447
Sum	9,904	8,379	8,753	9,661	8,926	7,583	10,528	19,365	19,113	29,769	30,381	12,868
1942										Period 1924-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	High		Low				Normal	Maximum	Minimum	
Jan.	1.69	1.18	16	602	16	199	319	19,600	24,371	* 45,250	14,500	
Feb.	1.70	1.17	28	614	1	195	299	16,600	21,689	* 36,880	13,300	
Mar.	1.70	1.02	24	615	1	135	282	17,400	22,371	39,420	14,000	
Apr.	2.66	.97	6	2,580	29	103	322	19,200	25,526	67,800	11,100	
May	3.05	.99	18	3,610	24	87.7	288	17,700	44,907	301,000	10,500	
June	1.75	.99	27	653	3	83.7	253	15,000	42,500	285,000	15,000	
July	1.76	.94	6	677	4	95.4	340	20,900	48,297	377,000	19,600	
Aug.	4.20	1.25	31	8,240	1	250	625	38,400	26,302	* 51,000	15,500	
Sept.	3.04	1.08	1	3,630	26	87.0	637	37,900	99,238	895,990	13,900	
Oct.	7.00	.96	18	24,300	14	113	960	59,000	51,887	349,000	18,600	
Nov.	7.10	.71	6	25,100	27	37.5	1,010	60,300	27,824	60,300	15,900	
Dec.	1.69	.70	11	578	11	35.9	415	25,500	25,593	49,520	15,900	
Yearly	7.10	.70		25,100		35.9	480	347,500	460,445	1,284,080	237,400	

* Estimated * Partly Estimated

RIO GRANDE AT DEL RIO STATION

DESCRIPTION: Water-stage recorder, located on the downstream side of a pier of the international highway bridge between Del Rio, Texas and Villa Acuña, Coahuila, and 693.4 river miles below the American Dam at El Paso, Texas. High stage measurements from highway bridge, low stage measurements from boat on cable 900 feet upstream. Zero of gage 863.80 feet above mean sea level, United States Coast and Geodetic Survey datum. Prior to February 20, 1942 the zero of this gage was one foot higher.

RECORDS: Based upon 18 meter measurements during the year, 15 by the United States Section and 3 by the Mexican Section. Computations by shifting channel methods. 1942 records fair. Records available: December 1923 to December 1942. Records are also available for station 11 miles upstream from May 1900 to April 1915; and for station 7.5 miles upstream at McKee's Switch from December 1919 to March 1920. Several small springs but no important tributaries enter the river between the various station sites.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions and drainage returns and by large reservoirs in the United States and Mexico.

EXTREME FLOWS: The highest recorded gage height was on September 1, 1932, when the extreme gage height was 34.5 feet, discharge 605,000 second feet. This is the greatest rate of discharge ever recorded at any point on the Rio Grande. (See Special Flood Report 1932 by American Section of this Commission). The lowest flow ever recorded was in May 1940, when the extreme gage height was .39 feet and the extreme flow 890 second feet. Numerous records of extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,060	3,250	3,570	2,410	2,840	7,320	4,850	3,310	25,500	21,100	4,740	4,100
2	3,960	3,200	3,450	2,300	2,890	6,900	5,520	3,430	22,000	20,300	4,540	4,120
3	3,910	3,220	3,240	2,200	2,990	6,700	4,800	3,280	23,300	18,300	4,520	3,880
4	3,850	3,160	3,220	2,180	2,990	6,650	5,000	3,450	25,900	14,900	4,380	3,830
5	3,750	3,060	3,200	2,160	3,120	6,650	6,040	4,380	28,700	12,600	4,640	3,940
6	3,790	3,200	3,010	2,400	3,490	6,650	5,670	3,460	29,400	11,400	11,500	3,770
7	3,780	3,230	3,000	2,850	3,740	8,100	5,960	3,350	32,800	9,890	11,100	3,740
8	3,780	3,140	3,220	2,910	3,830	6,850	5,510	2,940	30,500	9,170	5,420	3,850
9	3,880	3,030	3,250	2,330	3,830	6,390	5,550	2,710	29,900	8,250	4,930	3,810
10	3,850	3,160	3,170	2,260	3,810	6,760	5,430	3,110	34,200	7,600	4,810	3,790
11	3,780	3,230	3,150	2,170	3,880	6,390	5,710	3,440	41,800	7,280	4,540	3,710
12	3,700	3,250	3,320	2,110	4,310	6,010	6,040	3,490	54,500	7,210	4,440	3,720
13	3,650	3,200	3,310	2,110	4,790	5,860	5,980	3,780	64,000	7,570	4,620	3,780
14	3,610	3,370	3,310	2,170	5,560	5,800	5,340	3,420	55,000	7,830	4,690	3,810
15	3,700	3,600	3,480	2,090	*5,760	6,050	5,240	3,250	33,200	10,700	4,670	3,910
16	3,700	3,710	3,500	2,010	*5,880	7,140	4,740	7,400	22,100	8,450	4,690	3,870
17	3,580	3,830	3,450	2,060	*6,100	6,890	4,330	8,020	18,000	8,430	4,730	3,850
18	3,710	3,990	3,180	2,230	*7,360	6,180	4,000	14,600	15,400	13,300	4,710	3,840
19	3,600	3,890	3,080	2,120	*14,800	6,070	3,770	11,200	15,000	12,400	4,650	4,040
20	3,520	4,030	3,080	2,490	*7,540	5,890	3,280	7,270	14,700	7,940	4,590	4,020
21	3,550	4,030	3,000	2,320	*6,500	5,920	3,030	8,150	14,700	7,010	4,530	4,260
22	3,450	4,120	2,900	2,290	*6,400	5,420	2,950	9,820	14,200	6,200	4,370	4,150
23	3,480	4,090	2,850	2,420	*6,560	5,490	3,170	12,200	13,100	6,250	4,410	3,960
24	3,470	3,970	2,760	2,360	*6,600	5,700	3,020	20,500	13,000	6,050	4,420	3,870
25	3,480	3,920	2,650	2,350	*7,200	5,700	3,690	18,000	14,200	5,920	4,110	4,090
26	3,420	3,790	2,590	2,290	6,970	5,520	4,980	16,800	15,400	5,630	4,090	4,040
27	3,280	3,790	2,490	2,240	*6,950	5,270	4,780	22,200	16,800	5,340	4,020	3,940
28	3,260	3,660	2,400	2,380	*6,950	5,040	4,160	25,200	18,800	5,170	4,270	3,690
29	3,140		2,400	2,410	*7,100	4,920	3,660	19,600	19,900	5,000	4,100	3,710
30	3,090		2,380	2,690	*7,400	4,960	3,500	17,500	20,800	4,980	4,160	3,580
31	3,140		2,460		*7,600		3,520	32,500		4,760		3,760
Sum	111,840	99,120	94,070	69,310	*175,740	185,170	143,220	301,760	776,800	287,320	149,210	120,430
1942										Period 1924-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day	Low			Normal	Maximum	Minimum	
Jan.	1.84	.99	1	4,340	30	2,960	3,610	222,000	171,462	344,000	103,000	
Feb.	2.63	.97	22	4,370	5	2,930	3,540	197,000	146,183	229,970	96,200	
Mar.	2.34	1.47	1	3,830	30	2,350	3,030	187,000	144,445	224,670	94,700	
Apr.	2.25	1.11	7	3,720	16	1,920	2,310	137,000	133,560	200,000	83,200	
May	9.15	1.66	18	*24,500	1	2,760	* 5,670	* 349,000	225,266	*700,000	68,200	
June	4.42	2.75	7	8,680	29	4,680	6,170	367,000	227,528	704,000	107,000	
July	4.40	1.65	5	8,330	22	2,840	4,620	284,000	257,127	*1,228,000	97,800	
Aug.	10.96	1.59	31	34,500	9	2,600	9,730	599,000	311,230	865,000	124,000	
Sept.	15.75	6.14	13	65,700	24	12,800	25,900	1,541,000	634,372	2,754,590	72,600	
Oct.	9.25	3.11	18	25,000	31	4,510	9,270	570,000	434,208	1,634,000	110,000	
Nov.	9.13	2.76	6	24,500	27	3,860	4,970	296,000	198,406	467,000	108,000	
Dec.	2.93	2.42	25	4,320	30	3,390	3,880	239,000	175,953	295,180	102,000	
Yearly	15.75	.97		65,700		1,920	6,890	4,988,000	3,059,742	6,041,720	1,639,000	

* Partly estimated.

ARROYO LAS VACAS NEAR VILLA ACUNA, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car located 1.5 miles upstream from Villa Acuña, Coahuila, and 1.8 miles upstream from the confluence with the Rio Grande just above 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, 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 127 meter measurements during the year, 124 by the Mexican and 3 by the United States Section. Computations by shifting channel methods. 1942 records good. Records available: Occasional estimates from June 1935 to March 20, 1938, after which the present record extends to December 31, 1942.

REMARKS: From January 1 to September 6, 1939, 3 gage readings a day during low flow, and hourly gage readings during flood flow were made on the staff gage at the station. A water stage recorder began operating September 7, 1939. The low flow of this stream is spring-fed. About 593 acres of land were irrigated from this stream above the gaging station in 1942.

EXTREME FLOWS: The highest recorded flow was on April 5, 1940, when a flow of 39,200* second feet was recorded with a gage height of 8.14 feet. The lowest flow was 0.7 second foot during several days in November 1938. The records of high flows prior to 1942 are doubtful because of the lack of meter measurements during flood flows. More definite figures will be published when better data are available.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.4	14.5	12.0	9.9	9.9	12.4	7.4	7.8	8.5	4.9	6.0	13.1
2	9.5	13.4	12.4	9.5	11.0	11.7	7.8	7.4	7.4	4.9	6.3	15.5
3	11.7	12.7	12.7	9.5	10.9	8.5	8.1	7.4	7.4	9.2	6.0	13.8
4	11.6	11.7	13.1	9.9	10.6	9.2	7.4	7.8	6.4	6.0	6.0	13.8
5	10.2	9.9	12.4	10.2	9.2	10.2	7.8	8.5	13.8	4.9	5.6	13.8
6	10.9	6.7	9.9	12.0	8.8	10.2	6.0	8.1	4.9	4.9	42.7	16.6
7	11.7	7.4	9.9	13.1	10.3	10.6	8.5	8.1	417	5.3	12.4	16.6
8	11.6	8.1	9.9	13.8	10.6	10.6	7.8	7.4	54.0	5.3	11.6	16.2
9	11.7	9.9	8.5	14.1	9.5	10.6	7.4	7.1	24.0	5.6	12.7	16.2
10	11.7	10.6	8.5	14.8	8.8	7.4	7.4	6.7	18.7	5.6	9.5	13.8
11	12.0	7.8	7.7	13.1	8.8	6.7	7.4	6.0	14.5	6.0	8.8	13.4
12	12.0	9.9	7.8	9.9	8.8	6.7	7.4	5.3	16.9	6.3	8.5	13.1
13	11.3	11.3	7.7	10.2	8.8	6.7	7.4	4.6	16.9	6.0	7.8	13.1
14	11.7	11.3	8.5	8.1	8.1	8.1	7.4	3.5	16.6	6.0	7.1	15.5
15	11.6	9.5	9.9	8.5	7.4	8.1	7.4	2.8	15.9	5.7	6.3	16.2
16	11.7	11.7	10.6	8.1	7.4	7.4	6.7	2.8	15.2	4.9	7.1	11.3
17	10.6	9.2	10.6	8.1	7.4	5.7	6.0	2.8	9.2	11.3	8.1	11.3
18	11.6	8.5	9.5	9.2	73.5	6.7	6.7	3.2	10.3	6.7	7.1	11.3
19	12.4	9.2	9.5	9.9	46.6	7.8	7.1	3.5	9.5	6.4	7.1	11.3
20	12.4	8.5	10.2	10.6	11.7	9.2	7.8	3.2	7.4	6.0	7.1	9.5
21	12.4	8.1	10.2	11.0	7.1	12.0	7.4	35.7	7.1	6.4	6.7	7.8
22	11.7	9.2	9.2	13.1	6.0	11.6	7.4	7.4	5.6	6.4	6.4	7.8
23	10.2	9.5	8.5	11.3	3.5	9.5	7.1	4.6	5.6	6.0	7.1	6.7
24	11.3	8.8	8.1	9.9	8.5	7.1	7.1	3.9	8.5	6.0	6.7	8.1
25	8.1	9.2	8.5	11.3	11.0	7.1	7.4	3.2	6.0	6.0	6.0	8.1
26	8.1	10.2	8.8	12.7	5.3	6.7	8.1	2.8	5.6	5.7	6.7	6.7
27	8.1	10.6	9.5	14.1	5.3	6.7	8.5	2.8	4.9	5.7	7.4	6.7
28	13.1	9.9	11.3	13.8	3.9	6.7	8.1	2.5	4.6	5.7	8.1	6.7
29	14.5	9.9	9.9	13.8	4.2	6.7	8.1	2.5	4.6	5.7	8.5	6.7
30	14.8	9.9	9.9	13.4	3.9	7.1	8.1	417	5.6	5.7	11.3	7.1
31	13.8	9.9	9.9	9.9	3.9	7.1	7.8	4.6	6.0	6.0	7.1	7.1
Sum	351.4	277.3	305.1	336.9	350.7	255.7	232.0	601.0	752.6	187.2	268.7	354.9

Month	1942						Period 1938-1942					
	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low	Day			Average	Maximum	Minimum	
Jan.	1.71	1.35	31	15.2	27	7.4	11.3	697	302	697	"	79.4
Feb.	1.71	1.38	1	14.5	6	6.4	9.9	550	286	550	"	113
Mar.	1.57	1.44	4	13.1	24	8.1	9.8	605	1,188	3,110	*	181
Apr.	1.51	1.38	10	15.5	16	8.1	11.2	668	3,129	13,300		168
May	4.66	1.25	18	2,600	23	5.3	11.3	696	485	748		156
June	1.28	1.12	5	15.5	17	5.7	8.5	507	410	953		118
July	1.31	1.05	5	15.9	6	4.2	7.5	460	1,970	7,900		460
Aug.	3.81	1.02	30	2,150	#	2.5	19.4	1,190	1,538	2,870		375
Sept.	4.46	.95	7	2,320	6	4.9	25.1	1,490	1,942	6,850		119
Oct.	1.54	1.15	3	39.9	1	5.7	6.0	371	330	461		134
Nov.	2.76	1.15	6	470	22	5.7	9.0	533	328	533		106
Dec.	1.31	1.18	15	16.2	23	6.4	11.4	704	379	704		131
Yearly	4.66	.95		2,600	2.5	11.7	8,471	12,287	22,423	7,396		

#Various days of the month. " Estimated * Partly Estimated.

SAN FELIPE CREEK STATION 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 and 4 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 gage is 875.05 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 15 meter measurements during the year, 12 by the United States and 3 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: September 1, 1931 to December 31, 1942.

REMARKS: The flow of this spring-fed creek was greatly modified in 1942 by municipal diversions at Del Rio of 1,661.4 acre feet and by irrigation diversions above this station.

EXTREME FLOWS: The highest recorded flow was on June 14, 1935, when a flow of 45,000 second feet was reached with a gage of 23.20 feet. With spring flow eliminated this storm flow corresponds to 726 second feet per square mile of watershed. The lowest flow was 2.2 second feet on December 19, 1934. Backwater from the Rio Grande reaches this station whenever the Rio Grande stage at Del Rio station gets above 14 feet or a flow of about 60,000 second feet.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	37.1	57.1	20.2	21.3	20.6	35.5	19.3	14.5	43.5	43.2	58.3	69.1
2	34.9	56.2	20.2	21.3	21.8	30.1	17.6	14.3	38.2	43.9	58.6	66.7
3	29.3	55.4	20.2	21.9	21.1	28.3	18.6	15.3	43.5	35.4	57.9	65.2
4	30.7	39.5	19.8	21.9	20.4	25.3	18.0	14.1	43.6	58.1	59.1	65.6
5	40.9	29.8	19.8	23.1	20.9	28.7	20.2	12.5	42.9	57.2	60.3	66.0
6	50.7	27.3	20.3	55.9	21.6	29.4	21.3	12.9	42.9	56.3	99.0	65.4
7	50.7	20.8	20.3	130	22.1	30.3	21.7	13.8	*1,530	55.3	69.0	64.9
8	50.7	22.2	20.9	57.5	22.0	27.9	22.3	14.7	171	53.6	69.2	64.4
9	49.6	21.5	19.3	34.4	21.6	25.5	22.2	15.1	64.2	53.6	68.6	62.9
10	49.4	21.2	16.5	29.4	21.7	25.1	18.3	16.6	57.0	54.3	67.0	64.3
11	49.2	18.3	17.1	27.9	21.2	21.5	16.5	15.5	52.6	54.3	65.3	64.3
12	49.0	17.9	17.1	28.6	20.2	22.0	18.7	14.5	47.8	53.4	65.6	64.2
13	48.8	18.6	17.1	27.8	19.6	21.9	18.1	15.4	53.6	53.4	65.8	62.3
14	49.5	18.7	20.4	27.0	17.0	22.5	16.8	15.9	50.3	53.4	64.3	62.3
15	49.3	18.8	24.7	25.6	17.7	26.0	16.0	17.0	47.8	182	63.6	62.3
16	48.2	19.0	24.7	25.5	* 17.4	22.4	16.4	26.7	44.5	60.3	63.9	64.1
17	48.0	19.1	24.1	26.1	18.6	21.2	16.7	20.3	43.7	60.3	65.1	65.9
18	47.8	19.3	25.9	26.0	366	21.2	17.7	19.7	46.8	60.2	64.4	65.0
19	49.4	19.4	24.7	25.9	1,790	21.6	17.0	19.3	50.1	60.2	64.7	65.0
20	53.6	19.5	25.3	25.3	55.3	20.5	17.3	18.2	50.9	59.2	64.9	64.9
21	53.4	19.7	25.2	25.3	44.4	21.5	17.7	43.6	51.6	59.2	66.1	66.8
22	53.2	20.4	25.8	21.3	43.0	22.5	18.1	36.7	50.0	60.0	67.3	65.8
23	53.0	20.0	25.2	20.6	41.5	22.0	17.3	19.4	46.7	57.2	67.5	64.9
24	52.8	19.6	22.1	19.2	54.5	21.9	18.2	18.8	48.2	57.1	69.7	63.9
25	52.6	20.1	19.7	18.1	35.1	21.9	17.5	19.4	52.3	55.6	69.9	63.9
26	51.5	19.6	19.1	20.4	36.8	22.3	18.4	17.2	52.2	55.8	70.2	62.9
27	51.3	19.7	19.7	20.3	38.4	22.3	18.2	17.8	51.4	56.1	70.4	62.0
28	51.1	20.2	19.6	19.6	39.4	21.7	18.1	17.3	50.6	56.3	71.6	61.9
29	51.2		20.1	20.8	40.3	21.1	17.3	17.8	48.9	56.6	71.1	63.8
30	52.3		20.1	20.7	38.9	21.0	16.0	34.9	46.4	56.0	70.5	*62.8
31	55.0		21.3		38.3		14.7	200	57.1			*61.8
Sum	1,494.2	698.9	656.5	886.7	3,007.4	725.1	562.2	1,083.3	*3,063.2	2,153.2	2,008.9	1,995.3
	1942								@ Period 1932-1942			
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day	Low			Normal	Maximum	Minimum	
Jan.	1.11	.71	31	55.9	3	27.9	48.2	2,960	4,125	7,070	934	
Feb.	1.13	.54	1	58.0	20	16.7	25.0	1,390	2,736	5,490	487	
Mar.	.72	.50	22	28.5	9	15.4	21.2	1,300	2,649	4,190	1,300	
Apr.	3.30	.56	7	412	25	17.0	29.6	1,760	2,831	* 6,120	566	
May	15.40	.55	19	12,900	14	16.4	97.0	5,970	4,057	6,700	2,310	
June	.85	.54	1	39.3	20	19.9	24.2	1,440	7,209	* 47,900	1,440	
July	.67	.49	8	26.7	15	15.5	18.1	1,120	3,253	* 5,350	1,120	
Aug.	8.50	.43	30	2,880	5	12.5	34.9	2,150	3,296	5,590	1,280	
Sept.	*12.20	.75	7	* 6,340	2	33.3	*102	* 6,080	5,187	19,100	2,070	
Oct.	7.60	.87	3	2,260	1	41.7	69.5	4,270	3,784	6,320	1,710	
Nov.	2.85	1.03	6	316	3	56.1	67.0	3,980	3,202	5,560	526	
Dec.	1.25	1.02	29	76.2	29	54.9	64.4	3,960	3,301	5,820	496	
Yearly	15.40	.43		12,900		12.5	50.3	36,380	45,630	98,137	22,202	

* Estimated * Partly Estimated @ The average, maximum and minimum discharges for September, October, November and December are for the period 1931 to 1942.

PINTO CREEK STATION NEAR DEL RIO, TEXAS

DESCRIPTION: Water-stage recorder, cable with sit-down cable car equipped for winch and heavy weights, and concrete control dam, 0.6 mile below Del Rio-Eagle Pass highway and 5.5 miles above 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 gage is 854.61 feet above mean sea level, United States Coast and Geodetic Survey datum. Also a series of pipe gages (high stage indicating gages) 750 feet upstream from the gage well.

RECORDS: Based upon 9 meter measurements during the year and stable rating curve. 1942 records good. Records available: November 1928 to December 31, 1942.

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

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

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	3.0	2.3	.8	.6	0	0	0	24.3	0	0	0
2	2.7	3.2	2.3	.7	.6	0	0	0	6.8	0	0	0
3	2.7	3.2	2.1	.7	.8	0	0	0	3.1	0	0	0
4	2.4	3.0	2.1	.6	.6	0	0	0	24.6	0	0	0
5	2.4	3.0	2.1	.6	.5	0	0	0	4.6	0	0	0
6	2.4	3.0	2.1	.7	.4	0	0	0	1.9	0	0	0
7	2.4	3.0	1.9	34.9	.2	0	0	0	118	0	0	0
8	2.4	3.1	1.3	11.1	.1	0	0	0	91.9	0	0	0
9	2.4	3.0	1.0	5.2	.2	0	0	0	37.9	0	0	0
10	2.4	3.3	1.3	3.3	.4	0	0	0	9.6	0	0	0
11	2.4	5.6	1.3	3.0	.4	0	0	0	6.3	0	0	0
12	2.7	5.0	1.6	2.8	.2	0	0	0	4.2	0	0	0
13	3.0	3.6	1.9	2.6	.1	0	0	0	4.0	0	0	0
14	4.3	3.6	1.9	2.6	.1	0	0	0	3.4	0	0	0
15	5.1	3.6	1.9	2.3	0	0	0	0	2.4	0	0	0
16	5.0	3.8	1.9	2.1	0	0	0	0	1.7	0	0	0
17	4.7	3.4	1.0	1.9	0	0	0	0	.7	0	0	0
18	4.7	3.2	.9	1.6	22.8	0	0	0	.7	0	0	0
19	4.4	2.6	.8	1.6	565	0	0	0	.5	0	0	0
20	4.4	2.3	.9	1.6	31.1	0	0	0	.5	0	0	0
21	3.0	2.3	.9	1.6	9.4	0	0	0	.4	0	0	0
22	3.1	2.6	.9	1.6	7.4	0	0	0	.3	0	0	0
23	3.1	2.6	.9	1.3	5.9	0	0	0	.4	0	0	0
24	3.2	2.6	.9	1.3	32.2	0	0	0	1.1	0	0	0
25	2.9	2.3	1.2	1.3	6.2	0	0	0	.2	0	0	0
26	2.9	2.3	1.4	.9	5.2	0	0	0	.3	0	0	0
27	2.9	2.3	.8	.9	2.7	0	0	0	0	0	0	0
28	2.8	2.3	.8	.8	2.7	0	0	0	0	0	0	0
29	2.8		.7	.7	2.1	0	0	0	0	0	0	0
30	3.1		.7	.6	1.8	0	0	0	0	0	0	0
31	2.8		.8		.7	0	0	48.9	0	0	0	0
Sum	98.2	86.8	42.6	91.7	700.4	0	0	48.9	348.8	0	0	0
1942									Period 1929-1942			
Month	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	High	Low			Normal	Maximum	Minimum		
Jan.	2.55	2.48	15	5.1	‡ 3	2.4	3.2	195	524	2,110	0	
Feb.	2.55	2.44	11	5.7	‡ 26	2.0	3.1	172	456	1,860	8.3	
Mar.	2.45	2.37	‡ 1	2.3	‡ 29	0.6	1.4	84.5	635	2,500	4.3	
Apr.	3.59	2.33	7	42.4	‡ 9	0.5	3.1	182	792	3,600	43.0	
May	9.59	1.45	18	4,700	‡ 15	0.0	22.6	1,390	2,548	20,500	28.0	
June	0.00	0.00	‡ 1	0.0	‡ 1	0.0	0.0	0	2,607	30,000	0	
July	0.00	0.00	‡ 1	0.0	‡ 1	0.0	0.0	0	3,872	30,000	0	
Aug.	3.94	0.00	31	71.7	‡ 1	0.0	1.6	97.0	3,849	48,700	0	
Sept.	5.91	0.00	7	775	‡ 27	0.0	11.6	692	2,313	17,300	0	
Oct.	0.00	0.00	‡ 1	0.0	‡ 1	0.0	0.0	0	976	4,000	0	
Nov.	0.00	0.00	‡ 1	0.0	‡ 1	0.0	0.0	0	462	2,150	0	
Dec.	0.00	0.00	‡ 1	0.0	‡ 1	0.0	0.0	0	564 †	2,180 †	0 †	
Yearly	9.59	0.00		4,700		0.0	3.9	2,812.5	19,958	76,259.3	2,651.4	

‡ And Other Days

† For the period 1928-1942.

RIO SAN DIEGO STATION AT JIMENEZ, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car. Masonry and concrete Cipoletti weir control for measuring discharges up to 700 second feet. The station is located 4.4 miles west of Jimenez, Coahuila, and five 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 U.S.C. & G.S. mean sea level datum.

RECORDS: Based upon 5 meter measurements during flood flows and a rating table. 1942 records good. Records available: 1924 to 1942. The records from 1924 to September 1932 are considered doubtful.

REMARKS: The weir control at this station was constructed in November 1932. From 1924 to 1932 there was a staff-gage at Paso del Salto, 3.1 miles upstream from the present station. The flow of this spring-fed stream is modified by two small storage reservoirs, San Miguel and Centenario on the Irrigation District of San Carlos, Coahuila, and by irrigation of Dolores Hacienda just above this station. One-fourth mile down stream from this gaging station water was diverted for irrigating about 1,236 acres of land in the Jimenez Community.

EXTREME FLOWS: The highest determined flow was on September 18, 1941, when a peak flow of about 75,220 second feet passed this station with a gage height of 20.96 feet on the present gage. According to local inhabitants the water level at the present gage reached the same height in 1905 as on September 18, 1941, but because of channel conditions it is thought that the maximum flow in 1905 was less than in 1941, even though the gage heights were the same. The river was dry on several occasions from April to June 1939.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	227	159	87.2	74.9	114	100	32.8	42.0	100	159	52.3	114
2	209	143	87.2	74.9	114	100	32.8	42.0	63.2	159	52.3	114
3	209	143	87.2	87.2	114	100	42.0	42.0	74.9	143	52.3	100
4	209	144	87.2	87.2	100	87.2	32.8	42.0	143	143	52.3	87.2
5	209	143	87.2	87.2	100	63.2	42.0	32.9	143	143	52.3	87.2
6	192	143	87.2	87.2	87.2	63.2	42.0	32.9	143	143	1,700	87.2
7	159	144	87.2	87.2	87.2	52.3	42.0	32.9	313	129	773	74.9
8	159	143	87.2	87.2	87.2	63.2	42.0	42.0	325	129	508	63.2
9	143	129	74.9	87.2	87.2	52.3	42.0	42.0	246	114	413	74.9
10	143	114	74.9	74.9	87.2	52.3	42.0	42.0	246	114	367	74.9
11	144	100	74.9	63.2	87.2	52.3	42.0	42.0	246	114	325	74.9
12	143	100	74.9	63.2	87.2	52.3	42.0	42.0	246	100	304	74.9
13	159	114	87.2	74.9	87.2	52.3	42.0	42.0	245	87.2	284	74.9
14	176	101	87.2	74.9	74.9	42.0	42.0	42.0	245	74.9	265	74.9
15	175	100	87.2	87.2	74.9	42.0	42.0	42.0	227	74.9	245	74.9
16	175	100	87.2	87.2	74.9	42.0	42.0	42.0	209	74.9	245	74.9
17	175	101	87.2	87.2	63.2	42.0	42.0	32.8	209	87.2	227	74.9
18	175	100	87.2	87.2	311	52.3	42.0	42.0	209	87.2	227	74.9
19	176	100	74.9	87.2	1,420	42.0	42.0	42.0	209	87.2	227	74.9
20	175	87.2	74.9	87.2	304	42.0	42.0	42.0	209	87.2	209	74.9
21	175	87.2	74.8	87.2	192	32.9	42.0	52.3	209	87.2	209	74.9
22	175	87.2	74.9	87.2	143	32.9	42.0	52.3	209	87.2	209	74.9
23	175	87.2	74.9	87.2	129	32.9	42.0	63.2	209	87.2	209	87.2
24	175	87.2	74.9	100	114	32.9	42.0	63.2	209	87.2	192	87.2
25	176	87.2	74.9	100	129	32.9	42.0	52.3	192	74.9	192	74.9
26	175	87.2	74.9	114	114	32.9	42.0	52.3	192	52.2	175	74.9
27	159	87.2	74.8	1,160	114	32.9	42.0	42.0	192	52.2	143	74.9
28	159	87.2	74.9	245	114	42.0	52.3	42.0	175	52.2	129	63.2
29	143	74.9	74.9	159	100	42.0	52.3	32.8	175	52.2	114	63.2
30	143	74.9	74.9	143	100	42.0	42.0	74.9	159	63.2	114	74.9
31	143	74.9	74.9	100	100	42.0	42.0	176	159	63.2	114	74.9
Sum	5,330	3,105.8	2,493.9	3,917.1	4,911.5	1,551.2	1,295.0	1,541.7	5,972.1	3,009.6	8,266.5	2,451.6

1942												Period 1933-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet					
	High	Low	Day	High	Day	Low			Normal	Maximum	Minimum			
												#	#	#
Jan.	3.25	3.08	#	227	#	143	172	10,570	9,020	36,430	2,910			
Feb.	3.12	2.95	1	159	#	87.2	111	6,160	5,979	25,760	1,970			
Mar.	2.95	2.92	#	87.2	#	74.9	80.4	4,950	5,508	21,500	2,140			
Apr.	6.99	2.89	27	3,250	#	63.2	131	7,770	6,093	16,820	1,110			
May	7.74	2.89	19	4,380	17	63.2	158	9,740	17,780	120,000	1,290			
June	2.99	2.79	#	100	#	32.8	51.7	3,080	11,258	62,240	1,420			
July	2.85	2.79	#	52.3	#	32.8	41.8	2,570	8,250	21,550	1,210			
Aug.	4.63	2.79	31	1,110	#	32.8	49.7	3,060	7,912	19,950	2,030			
Sept.	4.17	2.89	7	844	#	63.2	199	11,850	21,391	84,620	2,210			
Oct.	3.12	2.85	#	159	#	52.3	97.1	5,970	26,250	146,640	1,950			
Nov.	8.83	2.85	6	6,640	#	52.3	276	16,400	15,921	68,290	1,960			
Dec.	3.02	2.89	#	114	#	63.2	79.1	4,860	9,810	45,160	2,060			
Yearly	8.83	2.79	#	6,640	#	32.8	120	86,980	145,152	381,720	27,460			

① The Average, Maximum and Minimum Discharges for October, November and December are for the period 1932 - 1942. # Various Days of the Month.

RIO SAN RODRIGO STATION 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 and 11.2 miles above the confluence with the Rio Grande. Zero of the gage is 879.95 feet above 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 1941 rating table, the lower portion of which conforms to the weir table. The upper portion of the rating table is based upon meter measurements. 1942 records good. Records available: 1922 to 1942. The records from 1922 to September 1932 are considered doubtful.

REMARKS: From 1922 to 1932 there were made daily 3 staff-gage readings at this station, on the same gage used at this station prior to December 1938, but the results of these readings are doubtful. This station was constructed in October 1932, at a point 1,640 feet upstream from Paso de las Mulas. In December 1938 the station was moved 3,300 feet downstream to the present site. The flow of this spring-fed river was modified by irrigation diversions above and below this station.

EXTREME FLOWS: The greatest recorded flow was on September 7, 1932, when the extreme gage height was 16.08 feet and the extreme flow 81,200 second feet. The river is sometimes dry.

CORRECTION: In Water Bulletins Nos. 8, 9, 10 and 11 the elevation of the zero of the gage has been in error. The correct elevation is shown above.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	96.1	64.3	*50.1	37.4	31.4	26.1	8.1	5.0	57.2	87.6	79.5	50.2
2	96.1	64.3	50.1	31.4	31.4	26.1	8.1	5.0	57.2	87.6	71.7	50.2
3	96.1	64.3	50.1	31.4	31.4	21.2	8.1	5.0	37.4	96.1	71.7	50.2
4	96.1	64.3	50.1	26.1	31.4	21.2	16.2	5.0	64.3	96.1	71.7	50.2
5	96.1	57.2	50.1	26.1	31.4	21.2	57.2	5.0	43.8	96.1	71.7	50.2
6	96.1	57.2	50.1	31.4	26.1	21.2	37.4	8.1	37.4	96.1	71.7	50.2
7	87.6	57.2	50.1	238	31.4	21.2	21.2	8.1	197	87.6	64.3	50.2
8	79.5	50.1	37.4	146	31.4	21.2	16.2	8.1	265	96.1	64.3	50.2
9	79.5	50.1	*37.4	71.7	26.1	21.2	16.2	8.1	270	87.6	64.3	50.1
10	79.5	57.2	*43.8	57.2	26.1	21.2	12.0	8.1	184	96.1	57.2	50.1
11	79.5	57.2	*43.8	43.8	26.1	16.3	8.1	4.9	132	96.1	64.3	50.1
12	71.7	57.2	43.8	37.4	26.1	12.0	8.1	96.1	96.1	96.1	71.7	50.1
13	71.7	57.2	43.8	37.4	21.2	12.0	8.1	8.1	87.6	96.1	71.7	50.1
14	79.5	64.3	43.8	31.4	21.2	12.0	8.1	8.1	79.5	96.1	71.7	43.8
15	79.5	64.3	50.1	37.4	21.2	8.1	4.9	4.9	79.5	96.1	64.3	43.8
16	79.5	57.2	50.1	37.4	16.2	8.1	4.9	8.1	64.3	96.1	64.3	43.8
17	71.7	57.2	*43.8	43.8	16.2	8.1	4.9	16.2	37.4	87.6	64.3	50.1
18	64.3	57.2	*37.4	43.8	78.4	12.0	4.9	50.1	43.8	87.6	64.3	50.1
19	64.3	57.2	37.4	43.8	238	12.0	4.9	37.4	50.1	87.6	57.2	50.1
20	64.3	57.2	37.4	43.8	79.8	8.1	2.1	26.1	57.2	87.6	57.2	50.1
21	64.3	57.2	37.4	204	57.2	8.1	2.1	21.2	64.3	87.6	50.1	50.1
22	71.7	57.2	37.4	64.3	43.8	8.1	2.1	21.2	71.7	87.6	50.1	43.8
23	71.7	50.1	37.4	50.1	37.4	8.1	4.9	16.2	79.5	79.5	50.1	43.8
24	64.3	50.1	37.4	43.8	31.4	8.1	5.0	16.2	87.6	79.5	50.1	43.8
25	64.3	50.1	37.4	37.4	26.1	8.1	5.0	16.2	87.6	79.5	57.2	37.4
26	64.3	*50.1	37.4	31.4	26.1	8.1	5.0	16.2	87.6	79.5	57.2	37.4
27	64.3	*50.1	31.4	37.4	26.1	8.1	5.0	16.2	87.6	79.5	57.2	37.4
28	64.3	*50.1	*37.4	31.4	26.1	8.1	5.0	12.0	87.6	79.5	57.2	31.4
29	64.3		*37.4	31.4	26.1	4.9	5.0	12.0	87.6	79.5	50.1	31.4
30	64.3		*37.4	31.4	26.1	4.9	5.0	16.2	87.6	71.7	57.2	31.4
31	64.3		*37.4		21.2		5.0	21.2		71.7		37.4
Sum	2,350.8	1,587.4	1,306.1	1,659.3	1,190.1	405.1	308.8	422.3	2,762.4	2,729.1	1,875.6	1,409.2

Month	1942						Period 1932-1942				
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day			Low	Normal	Maximum	Minimum
Jan.	.56	.43	#	96.1	#	64.3	75.8	4,660	3,797	14,850	171
Feb.	.43	.36	#	64.3	#	50.1	56.7	3,150	2,731	11,580	555
Mar.	.43	.26	3	64.3	27	31.4	42.1	2,590	2,670	9,900	576
Apr.	2.20	.23	21	855	#	26.1	55.3	3,290	2,304	6,870	382
May	2.10	.16	18	795	#	16.2	38.4	2,560	6,064	42,330	58.0
June	.23	.07	#	26.1	#	4.9	13.5	804	5,234	37,630	30.0
July	.69	0	5	132	#	0	10.0	613	3,933	12,170	0
Aug.	.95	.07	17	221	#	4.9	13.6	838	3,646	13,160	39.0
Sept.	2.17	.26	7	837	#	31.4	92.1	5,480	31,238	*253,960	471
Oct.	.56	.46	#	96.1	#	71.7	88.0	5,410	11,505	81,360	815
Nov.	.49	.36	#	79.5	#	50.1	62.5	3,720	5,399	24,450	535
Dec.	.39	.26	#	77.2	#	31.4	45.5	2,800	4,401	19,060	131
Yearly	2.20	0		855		0	49.3	35,715	82,922	414,310	7,436

Various Days * Partly Estimated

RIO GRANDE AT EAGLE PASS STATION

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 gage is 682.91 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 158 meter measurements, 147 by the Mexican and 11 by the United States Section during the year. Computations by shifting channel methods. 1942 records good. Records available: May 1900 to April 1916; November 1923 to December 1942.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions, drainage returns, and large reservoirs in the United States and Mexico. On April 10, 1939, the operation and maintenance of this station was turned over from the United States Section to the Mexican Section of the 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. (See Special Flood Report 1932 by the United States Section of this Commission.) The lowest flow ever recorded was on August 19, 1937 when the extreme gage height was 2.22 feet and the extreme flow 632 second feet. Numerous records of extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,200	3,080	3,460	2,060	2,600	6,990	4,340	3,090	28,530	18,220	4,730	4,100
2	4,100	3,140	3,140	1,970	2,730	6,850	4,410	3,140	20,310	19,180	4,730	4,060
3	4,130	3,030	2,950	1,900	2,810	6,390	4,940	3,250	20,480	18,360	4,200	4,030
4	4,060	3,100	2,870	1,830	2,830	6,600	4,380	3,230	23,130	15,890	3,880	3,710
5	3,920	3,120	2,960	1,870	2,910	5,970	7,030	3,810	26,030	13,420	3,960	3,740
6	3,880	2,900	2,940	2,020	3,050	6,040	6,150	3,640	27,930	11,580	8,370	3,810
7	3,920	3,020	2,930	3,570	3,200	6,850	5,300	3,320	30,090	10,050	21,900	3,600
8	3,920	2,930	3,050	3,530	3,270	6,960	5,370	2,970	34,820	8,970	7,560	3,640
9	4,060	2,800	3,320	3,080	3,850	6,110	5,020	2,750	28,360	8,370	5,970	3,570
10	4,170	2,830	3,040	2,340	3,570	5,860	4,910	3,810	31,290	7,700	5,540	3,460
11	4,100	2,910	2,940	2,210	3,360	6,110	4,870	3,290	35,630	7,380	4,870	3,810
12	3,990	2,990	3,000	2,180	3,530	5,720	5,190	2,840	44,500	7,520	4,520	3,420
13	3,780	2,890	3,050	2,000	3,950	5,440	5,650	3,080	57,530	7,310	4,660	3,370
14	3,880	2,850	3,040	1,960	4,730	5,160	5,090	3,090	65,190	7,700	4,840	3,450
15	4,170	3,050	3,110	2,070	5,330	5,010	4,630	2,980	53,250	10,380	4,910	3,470
16	3,850	3,200	3,250	1,930	5,300	5,650	4,840	4,800	23,870	9,540	5,090	3,530
17	3,490	3,230	3,140	1,890	5,400	6,250	4,130	7,810	20,450	8,440	5,090	3,500
18	3,520	3,430	2,920	1,990	5,720	5,760	3,850	10,350	16,560	9,180	5,050	3,510
19	3,740	3,510	2,710	2,120	24,510	5,370	3,600	13,420	14,970	17,900	4,770	3,600
20	3,640	3,480	2,720	2,010	11,090	5,050	3,350	8,330	15,540	9,110	4,520	3,810
21	3,600	3,570	2,690	2,320	6,500	5,010	3,000	6,960	13,950	7,350	4,590	3,890
22	3,570	3,670	2,570	2,140	6,250	4,700	2,860	8,340	16,100	6,670	4,660	4,130
23	3,360	3,810	2,550	2,260	6,210	4,660	2,730	9,540	13,170	6,220	4,450	3,890
24	3,270	3,710	2,440	2,330	6,430	4,730	2,840	15,820	12,330	5,930	4,340	3,670
25	3,250	3,920	2,380	2,280	6,360	4,840	2,710	18,400	13,700	5,830	4,130	3,740
26	3,300	3,850	2,260	2,230	7,310	4,840	3,670	15,400	15,190	5,830	3,960	3,850
27	3,110	3,710	2,150	4,940	6,600	4,730	4,310	18,360	16,070	5,370	3,990	3,780
28	3,030	3,710	2,020	2,710	6,500	4,490	4,100	24,580	17,830	5,260	3,880	3,600
29	3,010		1,990	2,400	6,640	4,380	3,570	20,520	19,560	5,010	4,170	3,340
30	2,930		2,040	2,390	6,850	4,380	3,160	17,230	20,770	4,770	4,060	3,420
31	2,910		2,000		7,030		3,150	24,610		4,590		3,350
Sum	113,860	91,440	85,610	70,530	176,420	166,900	133,150	271,330	777,130	289,010	161,390	113,850
1942										Period 1924-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	High		Low	Normal			Maximum	Minimum		
Jan.	4.36	3.51	1	4,450	31	2,800	3,670	225,800	188,969	365,000	104,400	
Feb.	4.20	3.48	25	4,270	10	2,770	3,270	181,400	156,493	254,250	99,200	
Mar.	3.94	2.95	1	3,640	31	1,910	2,760	169,800	153,667	247,440	95,900	
Apr.	5.41	2.82	27	7,170	5	1,780	2,350	139,900	144,166	219,000	92,100	
May	12.34	3.28	19	38,800	1	2,490	5,690	349,900	263,256	869,000	77,500	
June	5.64	4.17	7	8,020	29	4,310	5,580	331,000	265,667	1,005,000	113,340	
July	6.33	3.25	5	10,060	23	2,620	4,310	275,942	275,942	1,255,000	125,000	
Aug.	11.81	3.12	31	35,700	10	2,190	8,760	538,200	325,300	969,000	136,000	
Sept.	15.85	7.09	14	68,200	24	12,200	25,900	1,541,400	670,329	2,857,410	80,900	
Oct.	9.32	4.23	19	24,600	31	4,450	9,320	573,300	479,746	1,680,300	121,000	
Nov.	10.37	3.94	7	30,400	28	3,810	5,370	320,100	227,407	512,800	109,000	
Dec.	4.10	3.58	1	4,310	1	3,160	3,670	225,800	194,329	369,760	105,620	
Yearly	15.85	2.82		68,200		1,780	6,710	4,860,700	3,345,271	6,668,460	1,798,000	

RIO ESCONDIDO STATION AT VILLA FUENTE, COAHUILA

DESCRIPTION: Water-stage recorder and cable with sit-down cable car, located 3.1 miles southwest of the City of Piedras Negras, 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 gage is 717.78 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 40 meter measurements. Computation by shifting channel methods. 1942 records good. Records available: 1922 to 1942.

REMARKS: This station was built in September 1932. From 1922 to 1932 there were made daily 3 staff-gage readings 2,300 feet downstream from the present station, but the results of these readings are doubtful. The elevation of the zero of this old gage was 0.79 foot above zero of the gage at the present station. The flow of this spring-fed stream is modified by irrigation diversions in the drainage basins of the San Antonio and the Escondido.

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

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	19.4	17.0	16.2	27.2	16.6	20.8	16.2	5.3	15.2	13.4	8.5	7.4
2	19.8	16.6	16.2	27.2	16.6	20.8	15.9	5.0	13.1	14.5	8.5	8.1
3	21.5	16.6	15.9	27.2	16.6	22.6	15.9	4.6	9.5	12.7	9.2	8.8
4	26.8	16.3	15.9	27.2	16.6	22.3	15.9	4.2	7.7	11.3	8.1	8.8
5	30.7	16.2	15.9	27.2	16.6	24.0	15.9	4.2	11.3	11.0	8.1	7.7
6	34.3	16.2	15.9	27.2	16.6	21.6	15.9	4.3	30.4	9.9	8.1	7.8
7	34.3	16.2	15.9	27.2	16.6	19.4	15.9	4.2	47.7	8.8	7.4	7.8
8	33.2	16.2	15.9	22.6	16.6	18.7	15.9	4.2	57.6	9.2	7.4	7.1
9	33.6	18.0	16.2	18.4	16.6	18.4	16.6	4.6	14.1	9.2	7.1	6.7
10	33.9	16.2	16.3	18.0	16.6	18.0	13.4	4.6	14.1	9.2	7.1	6.7
11	34.3	18.0	16.2	17.6	16.6	18.0	10.2	4.6	13.8	9.5	7.1	6.7
12	34.6	18.0	18.0	16.9	16.6	23.3	7.4	4.3	13.8	9.5	7.1	6.7
13	35.0	17.7	18.0	16.6	16.6	21.5	7.8	4.2	13.8	9.5	7.1	6.7
14	35.7	17.7	18.0	16.2	14.5	15.9	8.1	4.2	13.8	9.5	7.1	6.7
15	41.0	19.4	18.0	15.9	14.5	14.8	8.5	4.2	13.4	9.9	7.1	6.7
16	37.4	19.4	18.0	16.2	14.4	13.4	8.5	4.3	13.4	9.9	7.1	6.3
17	37.4	17.7	18.0	16.6	14.5	14.5	8.5	4.2	13.4	11.0	7.1	6.4
18	37.4	17.7	18.0	16.6	14.5	15.5	8.8	4.2	13.1	10.9	6.3	6.4
19	33.5	17.7	19.8	17.0	14.4	22.6	8.8	4.2	13.1	10.9	6.3	6.4
20	27.5	19.4	19.8	17.3	14.5	19.1	8.8	4.2	13.1	11.3	6.3	6.4
21	27.5	18.0	19.4	17.6	18.4	13.8	8.8	4.2	12.7	11.3	6.3	6.3
22	27.5	18.0	19.4	18.0	18.3	14.1	8.8	9.9	14.1	11.7	6.3	6.4
23	27.9	18.0	24.7	18.0	16.6	14.1	8.5	9.9	14.1	11.7	6.3	6.4
24	27.9	16.3	23.0	17.7	16.6	14.1	8.1	7.4	13.1	11.7	6.3	6.4
25	27.9	16.6	17.7	17.7	16.6	16.2	7.4	5.7	14.5	12.0	6.0	6.0
26	27.9	16.6	18.0	17.3	16.6	16.2	6.7	4.6	14.5	12.0	6.4	6.7
27	25.8	16.6	18.4	17.3	16.6	16.3	6.0	4.6	13.4	11.7	6.4	6.0
28	19.8	16.6	19.1	17.3	16.6	16.2	5.7	4.2	13.4	10.6	6.7	6.7
29	17.7		21.2	17.0	16.6	16.2	6.0	3.9	13.4	10.2	6.7	6.7
30	17.3		21.9	17.0	16.6	16.3	5.7	3.9	13.8	10.9	6.7	6.7
31	17.3		24.7		16.6		5.3	18.7		10.6		6.7
Sum	905.8	484.9	569.6	591.2	503.2	538.7	319.9	164.8	921.7	335.5	212.2	213.3

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1932-1942 Acre Feet		
	High	Low	Day	High	Day	Low			Normal	Maximum	Minimum
							High	Low			
Jan.	2.33	1.97	15	41.0	31	17.3	29.2	1,800	3,395	15,990	375
Feb.	2.03	1.94	21	19.8	3	15.5	17.3	962	1,953	9,990	179
Mar.	2.13	1.94	23	24.7	24	14.8	18.4	1,130	1,784	6,910	219
Apr.	2.10	1.97	1	27.2	15	15.9	19.7	1,170	2,111	5,360	582
May	2.00	1.90	#	18.4	#	14.5	16.2	998	4,710	23,840	494
June	2.20	1.90	19	27.9	21	13.8	18.0	1,070	4,055	19,730	618
July	1.97	1.57	20	21.9	27	6.0	10.3	655	2,463	9,290	271
Aug.	2.30	1.41	31	31.8	30	3.5	5.3	327	2,358	14,530	174
Sept.	9.02	1.61	7	2,420	4	5.7	30.7	1,830	3,160	14,340	186
Oct.	2.00	1.80	2	14.5	31	8.8	10.8	665	5,102	39,790	117
Nov.	1.84	1.71	3	9.2	25	6.0	7.1	421	3,261	25,590	101
Dec.	1.80	1.74	#	8.8	#	6.0	6.9	423	3,317	20,720	336
Yearly	9.02	1.41		2,420		3.5	15.8	11,431	37,669	126,090	9,550

Various days of the month.

RIO GRANDE AT LAREDO STATION

DESCRIPTION: Water-stage recorder and cable with sit-down cable car. Until May 22, 1942 the water stage recorder was attached to the north abutment of railroad bridge over the Rio Grande between the cities of 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 351.50 feet. The cable is located 2 miles upstream from the railroad bridge. Zero of the gage at the cable is elevation 353.15 feet. All gage elevations are on U.S.C. & G.S. sea level datum.

RECORDS: Based upon 165 meter measurements, 162 by the Mexican and 3 by the United States Section. Computations by shifting channel methods. 1942 records good. Records available: May 1900 to March 1914 and from October 1922 to December 1942.

REMARKS: The river flow at this station is modified by many irrigation diversions, drainage returns, and large reservoirs in the United States and Mexico.

EXTREME FLOWS: The greatest recorded flow at this station was on September 3, 1932, when the peak gage reading was 52.20 feet, the flow being 402,000 second feet. On June 20, 1938, a minimum flow of 777 second feet was reached with a gage height of 4.4 feet. Numerous records of extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,800	3,500	3,890	2,470	2,520	7,060	4,730	3,570	24,900	20,340	5,680	4,340
2	4,840	3,600	3,990	2,440	2,720	6,920	5,020	3,570	31,360	20,700	5,580	4,630
3	4,770	3,570	3,810	2,400	2,800	6,750	30,190	3,570	23,130	21,080	5,300	4,350
4	4,840	3,670	3,570	2,440	2,810	6,500	10,910	3,450	23,840	20,410	4,770	4,560
5	4,870	3,710	3,450	2,350	3,090	6,600	19,640	3,240	26,590	21,050	4,590	4,340
6	4,800	3,780	3,340	2,320	3,370	6,640	42,730	3,570	28,920	14,130	4,520	4,170
7	4,590	3,600	3,310	2,510	3,410	6,600	12,640	4,380	27,620	12,040	7,490	4,170
8	4,450	3,510	3,110	4,940	4,020	6,570	6,180	3,460	41,320	10,980	18,120	4,200
9	4,380	3,420	2,910	4,020	3,600	6,360	5,930	3,360	37,430	10,350	8,580	4,100
10	4,380	3,480	3,010	3,640	3,500	6,070	5,580	3,040	30,410	9,680	6,180	4,380
11	4,410	3,550	3,040	3,130	3,480	6,360	5,620	2,890	30,260	8,620	5,400	4,380
12	4,450	3,570	3,100	2,600	3,380	6,140	5,510	2,820	35,240	7,910	5,230	4,200
13	4,380	3,570	3,090	2,380	3,570	5,760	5,790	3,280	40,610	7,450	4,980	4,030
14	4,410	3,470	3,160	2,380	3,950	5,440	5,970	3,290	47,680	7,100	4,770	3,780
15	4,510	3,450	3,250	2,380	4,380	5,370	5,850	3,670	54,030	7,270	4,910	3,850
16	4,340	3,360	3,230	2,170	4,590	5,300	5,260	3,460	45,730	8,400	4,980	3,920
17	4,340	3,530	3,310	2,330	4,980	5,760	5,120	3,810	25,320	8,970	5,050	3,850
18	4,170	3,710	3,390	2,180	5,300	6,710	4,660	8,160	18,470	8,260	5,120	3,810
19	4,170	4,100	3,340	2,690	28,220	6,250	4,130	8,280	16,030	9,180	5,190	3,850
20	4,170	4,060	3,300	2,390	41,670	5,650	3,920	12,360	21,930	15,890	5,260	3,990
21	4,240	4,100	3,120	3,150	23,380	5,650	3,780	9,080	15,860	10,420	5,230	4,310
22	4,270	4,130	3,010	3,400	8,230	5,510	3,470	7,240	14,230	8,790	5,050	4,410
23	4,310	4,240	2,910	3,070	6,670	5,580	3,190	8,790	15,890	8,300	4,730	4,480
24	4,200	4,130	2,830	2,810	7,420	5,080	3,070	9,680	13,170	7,590	4,730	4,560
25	4,170	4,130	2,900	2,950	6,360	5,400	3,000	15,430	12,710	7,030	4,940	4,590
26	4,170	4,130	2,710	2,860	5,930	5,510	3,080	17,410	13,560	6,570	4,770	4,450
27	4,020	4,060	2,610	2,650	5,540	6,180	3,240	14,970	14,590	6,140	4,480	4,560
28	3,920	4,060	2,540	3,330	5,720	6,570	4,800	17,580	16,140	5,690	4,380	4,340
29	3,740		2,420	4,480	5,900	6,810	4,700	22,780	18,190	5,510	4,410	4,270
30	3,640		2,420	3,370	6,140	4,840	4,270	20,230	18,960	5,540	4,520	4,130
31	3,500		2,390		6,710		3,850	17,410		5,370		4,030
Sum	134,050	105,170	96,440	86,230	223,360	181,940	235,810	248,450	784,120	326,760	168,940	131,230

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	High		Low	Normal			Maximum	Minimum	
			Day	Day							
Jan.	6.07	5.58	2	4,840	31	3,410	4,320	265,900	187,305	351,700	113,600
Feb.	5.91	5.51	23	4,310	16	3,360	3,760	208,600	154,358	237,400	99,400
Mar.	5.61	5.09	2	3,990	31	2,330	3,110	191,300	151,737	223,000	95,700
Apr.	6.50	4.79	8	5,930	18	2,070	2,870	171,000	151,942	401,000	95,600
May	16.01	5.15	20	49,090	1	2,520	7,210	443,000	300,226	906,200	112,700
June	6.89	5.91	2	7,060	30	4,700	6,060	360,900	307,500	1,390,200	89,200
July	17.98	5.25	6	54,030	25	2,850	7,610	467,700	293,205	1,250,200	128,800
Aug.	10.56	5.18	29	23,700	12	2,760	8,010	492,800	317,716	888,200	127,000
Sept.	17.45	8.33	15	55,440	25	12,570	26,140	1,555,300	710,311	3,116,700	87,300
Oct.	10.89	6.17	5	25,670	31	5,370	10,540	648,100	522,474	2,071,600	125,800
Nov.	10.89	5.91	8	22,990	28	4,380	5,630	335,100	233,737	570,800	122,100
Dec.	5.94	5.64	2	4,770	15	3,670	4,290	260,300	196,026	352,700	106,700
Yearly	17.98	4.79		55,440		2,070	7,460	5,400,000	3,526,537	7,310,300	1,862,800

" Estimated.

RIO SALADO STATION AT CD. GUERRERO, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and two reinforced concrete Cipoletti weirs, with a combined capacity of 636 second feet. These weirs were constructed in December 1938. This station is located at the place called "El Cable" about 6.2 miles above the confluence of the Rio Salado with the Rio Grande and 2 miles southwest of Ciudad Guerrero, Tamaulipas. This stream enters the Rio Grande 946.1 river miles below the American Dam at El Paso, Texas. Zero of gage is 265.74 feet above mean sea level, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 198 meter measurements during the year and the weir discharge records. Computations by shifting channel methods for flow greater than 636 second feet. 1942 records good. Records available: 1901 to 1912; 1923 to 1942.

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

EXTREME FLOWS: The greatest recorded flow at this station was on September 7, 1933, when an extreme gage height of 18.86 feet was reached with a corresponding discharge of 43,800 second feet. The stream is sometimes dry. Numerous extremes may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	60.0	48.7	18.3	12.7	43.4	14.5	26.5	43.4	12.7	26.5	26.5	12.7
2	60.0	45.9	16.6	12.7	35.7	11.3	48.7	31.1	12.7	35.7	24.4	12.7
3	60.0	40.6	18.3	16.6	28.6	9.9	24.4	26.5	929	38.1	22.2	12.7
4	63.2	38.1	18.3	18.4	24.3	8.5	226	24.4	540	770	20.5	12.7
5	69.2	35.7	18.3	16.6	20.5	6.7	3,327	22.2	304	2,730	20.5	12.7
6	72.4	31.1	16.6	14.5	16.6	5.3	7,734	22.2	197	2,285	20.5	14.5
7	72.4	26.5	16.6	12.7	16.6	5.3	2,698	156	273	2,723	20.5	12.7
8	75.6	24.4	18.4	12.7	1,208	3.9	1,074	92.9	12,325	1,201	20.5	12.7
9	75.6	26.5	20.5	12.7	1,402	3.9	551	48.7	4,732	858	20.5	12.7
10	75.6	22.2	20.5	12.7	498	2.8	360	33.2	1,240	388	18.4	14.5
11	72.4	22.2	18.4	11.3	473	2.8	322	26.5	671	235	18.4	14.5
12	69.2	20.5	16.6	11.3	399	1.8	286	24.4	869	162	18.4	14.5
13	72.4	20.5	16.6	9.9	252	1.8	452	20.5	1,208	113	16.6	16.6
14	72.4	22.2	16.6	9.9	169	.7	371	20.5	791	84.0	16.6	16.6
15	75.6	24.4	16.6	9.9	113	0	227	18.4	410	66.0	16.6	16.6
16	72.4	26.5	16.6	8.5	79.8	0	143	16.6	169	54.4	18.4	16.6
17	72.4	26.5	22.2	6.7	60.0	0	108	18.4	119	43.4	18.4	16.6
18	79.8	26.5	22.2	6.7	48.7	0	88.3	28.6	97.8	38.1	18.4	14.5
19	79.8	24.4	20.5	6.7	607	0	72.4	69.2	75.6	33.2	16.6	14.5
20	79.8	22.2	18.4	6.7	8,092	0	60.0	43.4	60.0	33.2	16.6	14.5
21	75.6	24.4	16.6	114	1,381	0	51.6	66.0	480	31.1	16.6	14.5
22	72.4	24.4	16.6	1,356	752	0	43.4	136	420	26.5	16.6	14.5
23	75.6	28.6	14.5	805	295	0	381	92.9	212	26.5	16.6	14.5
24	72.4	26.5	12.7	685	156	0	175	66.0	113	24.4	16.6	14.5
25	72.4	24.4	14.5	360	97.8	16.6	69.2	48.7	75.6	24.4	16.6	14.5
26	69.2	22.2	14.5	197	66.0	554	48.7	38.1	57.2	24.4	16.6	14.5
27	66.0	20.5	14.5	119	51.5	92.9	35.7	28.6	43.4	26.5	14.5	14.5
28	63.2	18.3	14.5	84.0	38.1	38.1	31.1	24.4	35.7	45.9	14.5	14.5
29	60.0		14.5	63.2	28.6	20.5	66.0	20.5	31.1	57.2	14.5	14.5
30	54.4		14.5	51.6	22.2	14.5	143	16.6	28.6	40.6	12.7	14.5
31	48.7		14.5		18.3		75.6	14.5		31.1		12.7
Sum	2,160.1	764.9	529.0	4,064.7	16,453.7	815.8	19,319.6	1,339.4	26,532.4	12,276.2	545.3	443.8

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1924-1942 Acre Feet		
	High	Low	Day	High	Day	Low	Acre Feet	Normal	Maximum	Minimum	
				Day							
Jan.	2.49	2.17	#	79.8	31	48.7	69.7	4,280	18,826	144,110	0
Feb.	2.17	1.71	1	48.7	28	16.6	27.3	1,520	13,200	98,520	0
Mar.	1.84	1.64	7	24.4	24	12.7	17.1	1,050	13,547	95,740	52.0
Apr.	6.30	1.51	22	1,940	#	6.7	13.5	8,066	13,557	54,500	56.4
May	11.48	1.71	20	11,190	6	16.6	531	32,630	46,162	* 253,000	5,110
June	5.41	1.12	26	1,150	#	0.0	27.2	1,620	41,915	192,000	1,620
July	12.80	1.57	5	15,710	1	9.9	623	38,320	22,463	100,000	228
Aug.	3.54	1.67	7	295	31	14.5	43.2	2,560	18,363	67,200	81.0
Sept.	13.42	1.61	8	16,240	#	11.3	884	52,630	99,349	600,000	3,310
Oct.	8.04	1.84	5	4,450	#	24.4	396	24,350	78,931	673,070	1,710
Nov.	1.90	1.64	1	28.6	30	12.7	18.2	1,080	28,483	248,590	246
Dec.	1.71	1.64	#	16.6	#	12.7	14.3	880	20,718	198,160	46.0
Yearly	13.42	1.12		16,240		0.0	233	169,080	415,514	1,350,260	101,770

Various Days. * Partly Estimated.

RIO GRANDE AT ZAPATA STATION

DESCRIPTION: Water-stage recorder and cable with stand up cable car and winch located about 3 miles below the town of Zapata, Texas, 7.5 miles northeast of Guerrero, Tamaulipas, 1.4 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, United States Coast and Geodetic Survey datum.

RECORDS: Based upon 66 meter measurements during the year, 55 by the United States and 11 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: January 1932 to December 31, 1942.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions, drainage returns, and large reservoirs in the United States and Mexico.

EXTREME FLOWS: The greatest recorded flow was on September 4, 1932, when the extreme gage height was 262.07 feet and the extreme flow was 261,160 second feet. (See Special Flood Report 1932, by the United States Section of this Commission.) The lowest flow recorded was on June 21, 1938, when the extreme gage height was 219.62 feet and the extreme flow 888 second feet.

Mean Daily Discharge in Second Feet 1942—Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,950	3,540	3,970	2,470	2,790	6,860	5,440	3,580	20,200	20,000	5,200	4,630
2	4,880	3,400	3,940	2,460	2,710	7,100	5,690	3,340	29,200	20,600	5,150	4,460
3	4,920	3,760	3,910	2,520	2,770	7,040	17,300	3,310	24,500	21,000	4,970	4,510
4	4,880	3,790	3,810	2,530	3,050	7,000	34,500	3,220	21,900	21,200	4,980	4,280
5	4,790	3,740	3,730	2,510	3,000	6,430	15,700	3,290	25,900	26,200	4,760	4,070
6	4,700	3,670	3,440	2,430	3,400	6,490	57,800	3,370	28,300	18,700	4,740	3,840
7	4,480	3,640	3,340	2,310	3,350	6,050	42,200	3,510	29,000	16,500	4,590	3,750
8	4,300	3,470	3,290	2,260	4,420	6,030	12,800	4,160	70,700	15,800	16,400	3,790
9	4,210	3,510	3,190	2,520	6,280	6,970	8,290	3,490	64,300	12,200	12,600	3,680
10	4,150	3,520	3,090	2,510	4,680	7,010	6,790	3,390	38,400	10,800	7,610	3,600
11	4,220	3,500	3,150	3,290	4,400	6,170	6,020	3,120	31,400	9,780	6,110	3,720
12	4,330	3,470	3,370	2,890	4,380	6,060	5,840	2,930	34,200	8,700	5,620	3,690
13	4,400	3,470	3,330	2,460	4,180	6,260	5,840	2,880	38,000	8,010	5,400	3,690
14	4,400	3,530	3,290	2,390	4,130	5,830	6,480	3,300	42,700	7,790	5,080	3,660
15	4,410	3,560	3,120	2,320	4,280	5,520	6,480	3,310	47,500	7,780	5,070	3,600
16	4,440	3,540	3,420	2,260	4,700	5,320	5,700	3,650	49,000	8,330	5,270	3,690
17	4,440	3,570	3,380	2,190	5,310	5,330	5,100	3,600	33,800	11,200	5,330	3,730
18	4,510	3,770	3,420	2,160	5,480	5,910	5,020	5,140	22,100	9,660	5,390	3,800
19	4,540	3,850	3,440	2,110	11,900	6,680	4,440	8,580	18,400	9,480	5,330	3,750
20	4,450	3,940	3,430	2,070	49,900	6,020	4,100	12,200	19,600	14,100	5,310	3,790
21	4,510	4,140	3,310	2,200	28,900	5,600	3,810	11,600	20,700	13,900	5,320	3,860
22	4,430	4,160	3,170	3,500	12,000	5,480	3,660	7,900	15,900	9,640	5,190	4,110
23	4,310	4,200	3,130	2,940	7,750	5,430	6,290	7,200	15,800	8,280	5,070	4,110
24	4,290	4,160	3,100	3,770	6,810	5,380	3,640	8,890	14,700	7,530	4,880	4,240
25	4,230	4,150	3,010	3,200	10,200	5,230	3,230	10,000	13,300	7,020	4,800	4,180
26	4,170	4,060	3,000	2,800	7,510	5,250	3,040	17,300	13,100	6,680	4,850	3,960
27	4,120	4,030	2,890	2,680	6,990	5,540	3,030	16,200	14,300	6,350	4,640	3,820
28	4,060	4,030	2,830	2,560	7,690	5,460	3,240	15,300	15,400	5,920	4,470	3,970
29	3,980		2,700	3,700	6,800	5,380	4,610	18,000	17,200	5,830	4,460	3,820
30	3,760		2,650	3,780	6,580	5,140	4,540	23,700	18,900	5,590	4,420	3,780
31	3,680		2,570		6,640		4,000	20,100		5,390		3,630
Sum	135,940	104,970	101,710	85,310	242,980	179,970	304,620	239,560	848,400	357,960	173,010	121,210

Month	1942						Period 1932-1942				
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day			Low	Normal	Maximum	Minimum
Jan.	221.57	221.16	1	5,010	31	3,620	4,390	270,000	209,525	*484,450	119,000
Feb.	221.39	221.06	24	4,250	9	3,660	3,750	208,000	171,289	*361,350	111,000
Mar.	221.28	220.72	1	4,030	31	2,500	3,280	202,000	181,279	292,000	124,000
Apr.	222.35	220.53	9	7,600	20	2,030	2,840	169,000	156,288	226,000	110,000
May	232.18	220.75	20	53,200	3	2,680	7,840	482,000	340,723	682,000	134,000
June	222.44	221.51	9	7,790	30	5,070	6,000	357,000	381,224	1,517,000	115,000
July	235.74	220.86	6	70,600	28	2,950	9,830	604,000	384,427	1,238,000	132,000
Aug.	226.13	220.78	30	24,500	13	2,770	7,730	475,000	329,671	665,000	163,000
Sept.	239.24	223.66	8	88,700	26	12,900	28,300	1,680,000	1,001,743	2,985,330	172,000
Oct.	226.80	221.74	5	27,500	31	5,320	11,500	710,000	710,704	2,396,440	165,000
Nov.	225.93	221.41	8	24,400	30	4,300	5,770	343,000	280,776	748,020	133,000
Dec.	221.50	221.23	1	4,630	31	3,490	3,910	240,000	227,651	591,380	116,000
Yearly	239.24	220.53		88,700		2,030	7,930	5,740,000	4,375,300	8,038,070	2,231,000

* Partly Estimated

RIO ALAMO STATION AT CD. MIER, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car and reinforced concrete weir for measurement of flows up to 177 second feet, located about 3 miles from the confluence of the Rio Alamo with the Rio Grande and .7 of a mile west of Ciudad Mier, Tamaulipas, Mexico, at a point called "Paso del Contaró." This stream enters the Rio Grande 984.6 river miles below the American Dam near El Paso, Texas. Zero of gage is 187.04 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 13 meter measurements at high flows during the year and the weir discharge tables at low flows. High flow computations by shifting channel methods. 1942 records good. Records available: July 1, 1923 to December 1942.

REMARKS: This station was rebuilt in December 1932. In December 1933, the cable was moved 980 feet upstream. The zero of its staff gage remained the same as before. The recorder and its gage were not moved. In September 1934, a channel with a small weir of 12 second feet capacity was constructed for measuring very low flows. In December 1938, a new weir of 177 second feet capacity was built to replace the former weir. The flow of this spring-fed stream is modified by small storage and irrigation diversions above this station.

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

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.5	6.0	8.1	6.0	6.0	6.0	226	6.0	1.1	33.9	43.8	33.9
2	21.5	6.0	6.0	6.0	6.0	6.0	682	6.0	1.1	31.4	43.8	31.4
3	21.5	6.0	6.0	6.0	6.0	4.2	59.0	6.0	1.1	24.7	43.8	31.4
4	21.5	8.1	6.0	6.0	4.2	2.5	195	4.2	0	33.4	43.8	33.9
5	18.7	8.1	6.0	6.0	4.2	2.5	502	4.2	360	2,030	40.6	31.4
6	15.9	6.0	6.0	6.0	2.5	2.5	3,050	268	491	2,220	37.1	31.4
7	15.9	6.0	6.0	6.0	2.5	2.5	3,140	18.7	59.0	5,760	33.9	27.9
8	15.9	6.0	6.0	6.0	2.5	2.5	1,210	6.0	15.9	491	37.1	24.7
9	15.9	8.1	6.0	6.0	2.5	1.1	265	6.0	316	165	37.1	24.7
10	13.1	6.0	6.0	6.0	6.0	1.1	137	4.2	195	115	33.9	27.9
11	13.1	6.0	8.1	6.0	8.1	1.1	94.3	2.5	109	89.7	33.9	27.9
12	13.0	6.0	10.6	6.0	6.0	1.1	75.9	2.5	1,455	84.8	33.9	27.9
13	13.1	8.1	13.1	6.0	4.2	0	99.6	2.5	1,070	75.9	33.9	27.9
14	13.1	10.6	13.1	6.0	4.2	0	71.3	1.1	306	71.3	33.9	27.9
15	13.1	10.6	10.6	6.0	2.5	0	51.2	1.1	99.6	67.1	33.9	27.9
16	13.1	13.1	10.6	4.2	2.5	0	47.3	1.1	71.3	63.2	33.9	27.9
17	13.1	10.6	13.1	6.0	1.0	0	47.3	37.1	54.7	63.2	37.1	31.4
18	13.1	13.1	13.1	4.2	0	0	43.8	165	47.3	59.0	37.1	31.4
19	15.9	10.6	10.6	4.2	1,420	0	37.1	51.2	47.3	59.0	33.9	27.9
20	13.1	10.6	8.1	4.2	4,060	0	27.9	18.7	43.8	59.0	33.9	31.4
21	10.6	10.6	8.1	*289	388	0	27.9	10.6	43.8	54.7	33.9	27.9
22	8.1	10.6	8.1	420	59.0	63.6	21.5	6.0	43.8	54.7	33.9	24.7
23	8.1	10.6	6.0	51.2	31.4	2,140	1,110	4.2	43.8	51.2	33.9	24.7
24	10.6	10.6	8.1	24.7	21.5	3,500	94.3	2.5	40.6	51.2	33.9	24.7
25	8.1	10.6	6.0	15.9	15.9	417	24.7	2.5	40.6	47.3	33.9	24.7
26	6.0	8.1	6.0	8.1	15.9	4,200	15.9	2.5	40.6	59.0	33.9	24.7
27	6.0	8.1	6.0	144	10.6	1,350	15.9	2.5	37.1	54.7	33.9	21.6
28	10.6	8.1	6.0	215	10.6	40.6	13.1	1.1	33.9	54.7	33.9	21.6
29	8.1	6.0	6.0	24.7	10.6	* 24.7	10.6	1.1	33.9	54.7	33.9	21.6
30	8.1	6.0	6.0	10.6	10.6	* 21.5	10.6	1.1	33.9	51.2	33.9	21.6
31	6.0	6.0	6.0	6.0	6.0	6.0	6.0	1.1	33.9	43.8	33.9	21.6
Sum	405.4	242.9	245.4	1,316	6,131.0	11,790.5	11,412.2	647.3	5,136.2	12,474.4	1,079.3	847.5

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1924-1942 Acre Feet		
	High	Low	Day	High	Low	Day			Normal	Maximum	Minimum
	Jan.	1.67	1.44	1	24.7	#	6.0	13.1	804	5,703	34,920
Feb.	1.54	1.44	#	13.1	#	6.0	8.7	482	4,146	25,550	67.2
Mar.	1.57	1.44	#	15.9	#	6.0	7.9	487	3,738	19,830	64.0
Apr.	4.76	1.41	27	1,500	#	4.2	43.9	2,610	7,061	26,710	86.0
May	10.99	1.31	20	9,460	#	0	198	12,160	17,973	* 137,000	209
June	8.07	1.31	26	5,830	#	0	393	23,390	17,312	83,240	0
July	9.84	1.44	7	8,720	31	6.0	368	22,640	9,912	37,590	255
Aug.	5.71	1.35	6	2,580	#	1.1	20.9	1,280	8,718	56,890	0
Sept.	6.23	1.28	1	3,140	#	0	171	10,190	28,561	190,520	* 135
Oct.	10.37	1.61	7	9,820	4	18.7	402	24,740	15,367	51,620	0
Nov.	1.90	1.74	1	47.3	25	31.4	36.0	2,140	4,561	21,940	0
Dec.	1.77	1.64	#	33.9	#	21.5	27.3	1,680	4,726	* 15,000	124
Yearly	10.99	1.28		9,820	0	142	102,603	127,778	316,793	11,908.7	

Various days of the month. * Partly estimated.

RIO GRANDE AT ROMA STATION

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 15.4 river miles above the confluence of the Rio San Juan from Mexico. Zero of gage is 145.90 feet above mean sea level, U.S.C. & G.S. datum.

RECORDS: Based upon 195 meter measurements, 183 by the Mexican and 12 by the United States Section, during the year from bridge. Computations by shifting channel methods. 1942 records good. Records available: August 1900 to March 1914; November 1922 to December 1942.

REMARKS: The river flow is greatly modified at this station by many irrigation diversions, drainage returns, and large reservoirs in the United States and Mexico. 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 turned over again to the Mexican Section of the Commission. Datum of present gage is 1.1 foot lower than that used prior to 1922. Backwater from the Rio San Juan sometimes reaches this station. See Water Bulletin No. 3, page 50.

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. (See Special Flood Report 1932 by United States Section of this Commission.) The lowest flow ever recorded was on August 25, 1937, when the extreme flow was 914 second feet, at a stage of -.32 feet. Records of other extreme flows may be found in previous Water Bulletins.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,940	3,600	4,030	2,470	3,190	7,280	5,010	3,960	19,670	19,530	5,440	4,200
2	4,700	3,410	3,780	2,430	2,700	7,380	6,990	3,460	30,440	20,090	5,190	4,310
3	4,450	3,380	3,570	2,490	2,610	7,520	6,250	3,340	27,470	20,200	4,940	4,310
4	4,560	3,470	3,600	2,520	2,690	7,130	39,550	3,350	22,670	21,050	4,870	4,240
5	4,520	3,670	3,640	2,560	2,920	6,600	16,670	3,360	25,210	29,100	4,870	4,100
6	4,590	3,530	3,470	2,460	3,140	6,360	52,260	3,710	29,810	22,000	4,730	4,130
7	4,590	3,530	3,250	2,400	3,450	6,390	65,330	3,710	30,940	20,980	4,660	3,990
8	4,480	3,360	3,180	2,200	3,480	6,290	19,920	3,990	51,210	15,080	8,330	3,990
9	4,450	3,290	3,140	2,930	5,660	6,500	9,430	3,960	69,920	12,110	17,380	3,880
10	4,340	3,390	2,990	6,500	5,370	7,730	7,490	3,530	45,910	10,910	9,080	3,740
11	4,340	3,600	2,920	4,770	4,410	6,640	6,600	3,250	30,090	9,850	6,670	3,810
12	4,380	3,460	3,190	3,710	4,540	6,070	6,460	2,990	32,350	8,480	5,760	3,850
13	4,380	3,470	3,340	2,800	4,170	6,140	6,360	2,840	37,430	8,330	5,260	3,810
14	4,380	3,480	3,250	2,470	4,060	6,110	6,820	2,900	40,960	8,260	5,120	3,850
15	4,240	3,530	3,240	2,330	4,130	6,040	6,600	3,200	44,500	8,020	4,940	3,670
16	4,240	3,430	3,370	2,250	4,560	5,720	6,670	3,400	48,030	8,330	5,160	3,640
17	4,270	3,430	3,330	2,260	5,330	5,540	6,140	3,990	39,200	10,140	5,230	3,780
18	4,380	3,640	3,350	2,260	5,830	5,650	4,940	4,450	25,210	10,310	5,190	3,850
19	4,380	3,880	3,460	2,270	6,500	6,570	4,910	8,400	20,590	9,110	5,190	4,030
20	4,240	3,880	3,430	2,150	44,850	6,500	4,480	10,240	18,430	10,560	5,230	3,920
21	4,100	3,990	3,390	2,210	36,730	5,690	4,240	13,490	22,180	15,640	5,300	3,880
22	4,130	3,960	3,250	3,260	15,430	5,650	4,100	9,360	17,020	10,210	5,260	3,960
23	3,960	3,810	3,160	3,460	9,150	6,640	6,750	7,200	15,400	8,330	5,300	4,130
24	4,030	4,030	3,070	3,180	7,450	9,220	6,290	8,930	16,530	7,450	5,050	4,330
25	4,060	4,200	2,910	3,490	9,320	5,610	3,810	10,420	13,630	6,920	4,800	4,310
26	4,100	3,990	2,910	3,080	8,650	9,570	3,250	17,270	13,490	6,430	4,660	4,270
27	4,030	3,890	2,860	2,930	7,200	7,770	3,120	18,790	14,020	6,360	4,450	3,960
28	3,880	4,030	2,720	3,150	7,700	5,510	3,180	16,350	14,800	6,250	4,310	3,880
29	3,920		2,710	2,550	7,420	5,370	4,170	19,740	16,390	6,000	4,170	3,960
30	3,810		2,660	4,940	6,740	5,190	4,770	23,310	18,360	5,790	4,200	3,850
31	3,640		2,610		6,810		4,520	20,590		5,610		3,600
Sum		102,330		88,480		196,380		247,480		367,430		123,030
	132,510		99,780		245,990		337,080		851,860		170,740	
1942												
Period 1924-1942												
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	High		Low	Normal			Maximum	Minimum		
			Day	Day								
Jan.	2.53	1.71	1	4,980	31	3,600	4,270	262,800	221,709	467,400	119,500	
Feb.	2.10	1.48	25	4,200	9	3,180	3,650	203,000	181,607	349,000	108,400	
Mar.	1.94	.79	1	4,130	31	2,520	3,220	197,900	184,794	325,500	99,000	
Apr.	3.61	.46	10	6,890	21	2,110	2,950	175,500	181,707	400,000	* 103,700	
May	15.45	.85	20	55,800	3	2,610	7,940	487,900	376,899	706,300	133,800	
June	5.64	2.62	26	12,000	30	5,090	6,550	389,500	402,497	1,586,600	92,600	
July	21.26	1.41	7	75,900	27	3,090	10,870	668,600	355,770	1,217,000	131,000	
Aug.	8.56	1.13	30	23,700	13	2,780	7,980	490,900	334,132	742,800	156,600	
Sept.	21.19	6.33	9	74,900	26	13,300	28,400	1,690,000	855,800	3,048,000	117,000	
Oct.	10.60	2.92	5	30,400	31	5,540	11,850	728,800	630,797	2,372,000	167,500	
Nov.	8.04	2.17	9	21,400	30	4,130	5,690	358,700	272,835	736,000	126,800	
Dec.	2.30	1.74	2	4,410	31	3,500	3,970	244,000	227,716	565,100	114,000	
Yearly	21.26	.46		75,900		2,100	8,120	5,877,600	4,226,266	8,098,000	2,227,000	

* Partly Estimated.

RIO SAN JUAN STATION AT SANTA ROSALIA, TAMAULIPAS

DESCRIPTION: Water-stage recorder and cable with sit-down cable car, located about 27.5 miles above the confluence with the Rio Grande and 15 miles southwest of Ciudad Carmargo, Tamaulipas, at a settlement called Santa Rosalia, 3 miles west of Ochoa Railway Station. This stream joins the Rio Grande 1,007.4 river miles below the American Dam at El Paso, Texas. Zero of gage is 205.15 feet, U.S.C. & G.S. sea level datum.

RECORDS: Based upon 220 meter measurements during the year, 216 by the Mexican and 4 by the United States Section. Computations by shifting channel methods. 1942 records good. Records available: May 1, 1900 to 1913; 1923 to 1942.

REMARKS: This station was established at La Quemada Ranch on May 1, 1900 and was moved 2.5 miles upstream to its present location on July 14, 1902. For detailed gage history see previous Water Bulletins. This station is within the basin of the Azucar Reservoir which is nearing completion. Because the diversion tunnel at Azucar Dam would discharge only about 7,000 sec. ft. a portion of the flow of the Rio San Juan was impounded from June 23 to 27 and July 7 to 9 and October 7 and 8. Subsequent to these dates the impounded water drained into the Rio Grande. The maximum impoundment of water occurred in June when approximately 75,000 acre feet were temporarily stored in Azucar Reservoir and when some water discharged over the partly completed spillway at an elevation of 65 meters Azucar Dam datum or 67.33 meters U.S.C. & G.S. mean sea level datum.

EXTREME FLOWS: On August 30, 1909, there occurred a flood which reached a height of 49.21 feet, present scale, and a discharge of approximately 353,000 second feet. On August 30, 1938, the peak discharge was 233,000 second feet, with a gage height of 42.65 feet. The river is dry at times.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	869	607	332	140	250	231	2,620	706	858	1,410	1,110	689
2	763	579	313	153	233	196	2,290	646	781	1,210	1,070	682
3	749	547	311	152	226	185	2,260	643	710	1,260	1,050	682
4	713	551	301	151	220	177	6,250	618	668	1,360	1,020	678
5	696	519	291	153	220	217	4,380	625	668	1,810	996	668
6	738	523	291	154	218	277	6,820	629	1,010	8,440	964	653
7	784	480	290	164	345	731	12,780	5,720	1,170	22,950	946	639
8	798	470	280	174	442	537	10,140	4,980	1,110	12,400	918	639
9	791	445	260	161	403	312	7,730	2,050	3,100	6,530	900	664
10	770	389	257	148	498	239	5,190	1,440	6,070	4,590	883	664
11	749	337	264	149	608	182	4,170	1,260	2,320	3,290	855	668
12	745	348	268	144	812	189	3,370	1,150	4,480	2,750	830	657
13	728	399	272	139	643	194	2,850	1,080	2,600	2,530	812	650
14	710	452	261	134	572	152	2,860	1,040	7,270	2,390	809	639
15	699	449	261	130	498	132	2,610	1,000	4,560	2,160	777	657
16	685	441	240	129	431	653	2,000	968	2,410	2,000	784	607
17	777	396	230	128	434	4,130	1,640	939	2,030	1,830	773	600
18	1,090	343	228	121	470	1,320	1,550	1,120	1,780	1,630	770	579
19	957	364	206	121	615	692	1,450	1,290	1,610	1,470	780	572
20	876	367	192	114	5,370	389	1,370	1,400	1,320	1,470	798	547
21	830	406	185	125	2,860	278	1,310	1,220	1,170	1,470	809	540
22	784	459	170	6,320	1,210	272	1,240	1,130	1,740	1,440	777	540
23	781	470	171	2,510	904	25,850	1,180	1,050	1,640	1,420	770	519
24	766	452	168	1,010	636	32,810	1,130	1,000	1,490	1,380	787	502
25	727	434	158	600	501	33,690	1,070	939	1,430	1,330	787	498
26	689	403	152	508	424	18,710	1,080	872	3,020	1,280	749	484
27	671	357	153	487	347	11,370	1,030	830	2,860	1,240	671	487
28	653	324	152	487	308	6,140	766	791	2,060	1,230	692	463
29	653	150	452	261	4,030	833	816	1,800	1,800	1,230	692	434
30	653	143	273	256	2,980	791	760	1,660	1,200	1,200	713	420
31	622	138		231		724	1,210		1,160			420
Sum	23,516	12,311	7,088	15,631	21,446	147,265	95,484	39,922	65,395	97,860	25,292	18,141
1942										Period 1924-1942		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low	Normal			Maximum	Minimum		
Jan.	4.92	3.87	18	1,230	31	622	759	46,640	35,631	93,500	7,580	
Feb.	3.84	3.28	1	607	28	324	440	24,420	22,002	92,800	2,860	
Mar.	3.35	2.56	1	332	31	138	229	14,060	17,313	56,600	1,810	
Apr.	15.75	2.43	22	11,830	20	114	521	31,000	20,903	98,400	1,670	
May	13.91	2.85	20	8,650	6	218	692	42,540	54,838	136,400	3,500	
June	23.39	2.49	25	44,850	15	127	4,910	292,100	139,054	586,200	5,180	
July	17.19	4.13	8	15,290	31	703	3,080	189,400	90,801	280,000	2,770	
Aug.	13.29	3.84	7	7,130	4	600	1,290	79,190	104,857	802,200	2,120	
Sept.	15.29	4.04	14	10,700	5	646	2,180	129,700	245,291	1,411,100	22,790	
Oct.	20.73	5.09	7	30,370	31	1,130	3,160	194,100	155,757	772,000	18,970	
Nov.	5.15	4.10	1	1,120	#	692	843	50,170	55,596	221,600	12,930	
Dec.	4.07	3.44	1	689	#	420	585	35,980	44,148	135,500	11,990	
Yearly	23.39	2.43		44,850		114	1,560	1,129,300	986,191	3,387,400	328,180	

Various days of the month @ Includes water which by-passed to the west of the station.

RIO GRANDE AT RIO GRANDE CITY STATION

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

RECORDS: Based upon 125 meter measurements during the year, 109 by the United States and 16 by the Mexican Section. Computations by shifting channel methods. 1942 records good. Records available: January 1, 1932 to December 31, 1942.

REMARKS: When the water at this station rises above a gage height of about 151 feet, water overflows the left river bank beyond the station cable, but such water is measured. The river flow here is greatly modified by many irrigation diversions, drainage returns, and large reservoirs in the United States and Mexico. During this year the Rio San Juan flow into the Rio Grande was further modified by some temporary storage of water in the new Azucar Reservoir. For further details of this see Rio San Juan Station record in this bulletin.

EXTREME FLOWS: The highest reported gage height was in 1909, when the extreme gage height was 159.2 feet, present gage datum, as reported by residents and confirmed by extreme gage height at Rio Grande City Weather Bureau gage and other points in the vicinity, as found in Joint Report of International Boundary Commission 1910-11. The lowest recorded flow was on May 9, 1940 when the extreme gage height was 124.10 feet and the extreme flow 946 second feet.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,850	4,300	4,280	2,570	4,260	7,060	8,070	4,660	18,900	20,400	6,510	5,010
2	5,810	4,180	4,200	2,480	3,220	7,470	8,970	4,200	24,100	21,600	6,230	5,110
3	5,670	4,040	4,140	2,520	2,900	7,430	8,540	3,790	28,800	22,200	6,220	5,070
4	5,630	4,050	4,100	2,580	2,810	7,080	34,300	3,700	23,800	22,800	6,110	5,050
5	5,630	4,170	4,030	2,600	3,010	6,830	30,000	3,610	23,900	34,500	6,010	4,950
6	5,530	4,150	3,990	2,610	3,130	6,620	38,700	3,620	31,700	*30,800	5,760	4,860
7	5,520	4,160	3,770	2,670	3,610	6,780	68,200	4,990	31,600	*33,500	5,610	4,700
8	5,380	4,120	3,610	2,670	3,770	7,120	52,100	9,040	36,100	32,100	5,650	4,620
9	5,270	3,860	3,550	2,750	4,370	6,970	24,900	8,940	68,100	25,200	19,100	4,666
10	5,270	3,960	3,450	4,830	6,040	7,250	16,700	5,720	63,300	20,200	13,000	4,710
11	5,200	4,000	3,330	5,360	5,180	7,290	12,900	4,810	43,000	16,900	8,880	4,720
12	5,240	*3,960	3,370	3,880	4,900	6,610	10,000	4,300	36,000	13,000	6,790	4,860
13	5,230	*3,920	3,550	3,300	4,960	6,300	10,000	3,920	42,000	11,300	6,490	4,780
14	5,220	*3,890	3,570	2,730	4,680	5,890	9,550	3,760	45,300	10,700	6,120	4,670
15	5,170	3,940	3,500	2,520	4,470	5,710	9,220	4,400	53,600	10,200	5,890	4,610
16	5,060	4,000	3,570	2,390	4,460	5,780	8,680	4,170	51,400	9,980	5,750	4,540
17	5,070	4,000	3,590	2,390	4,760	6,680	7,500	4,470	46,600	10,100	5,890	4,530
18	5,100	3,990	3,490	2,230	5,470	8,040	6,650	5,320	29,400	12,100	5,940	4,550
19	5,330	4,100	3,520	2,080	4,970	6,540	6,290	7,350	21,100	10,800	5,780	4,500
20	5,230	4,160	3,560	1,970	27,000	6,670	5,730	10,600	18,600	11,100	5,900	4,450
21	4,960	4,220	3,540	2,000	47,400	6,200	5,440	14,000	23,800	15,700	5,960	4,400
22	4,930	4,430	3,420	3,400	23,500	5,870	5,230	11,700	19,900	13,300	6,030	4,390
23	4,830	4,540	3,470	8,320	11,400	11,200	5,610	8,640	17,600	10,800	6,010	4,690
24	4,740	4,610	3,180	5,820	8,530	24,900	8,080	8,200	17,900	9,700	5,750	4,630
25	4,760	4,620	3,170	4,810	8,240	33,800	5,470	9,960	15,200	8,930	5,440	4,650
26	4,750	4,530	3,100	4,050	10,100	32,700	4,570	13,500	15,100	8,150	5,180	4,580
27	4,840	4,410	3,030	3,340	8,000	28,200	4,230	16,700	16,800	7,800	5,240	4,500
28	4,680	4,340	2,920	3,330	7,570	18,800	3,970	15,500	17,300	7,560	5,150	4,450
29	4,620		2,840	3,250	7,940	14,500	3,830	17,400	18,000	7,400	5,040	4,610
30	4,580		2,730	*3,560	7,240	11,600	5,080	20,800	19,100	7,080	5,030	4,560
31	4,420		2,650		6,870		5,310	20,700		6,820		4,520
Sum	159,520	116,610	108,230	99,010	254,760	323,890	433,820	262,110	918,000	483,620	198,460	144,960

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	High		Low				Normal	Maximum †	Minimum
			Day		Day						
Jan.	128.69	127.53	1	5,890	31	4,320	5,150	316,000	263,214	521,000	140,000
Feb.	127.91	127.15	25	4,660	14	3,860	4,160	231,000	209,157	*368,690	125,000
Mar.	127.67	126.16	1	4,410	31	2,630	3,490	215,000	210,251	401,000	108,000
Apr.	129.85	125.65	23	8,780	21	2,000	3,300	196,000	205,249	395,000	118,000
May	141.95	126.33	21	50,500	4	2,780	8,220	505,000	442,846	833,000	153,000
June	137.57	128.77	25	36,400	15	5,510	10,300	662,000	542,674	1,737,000	94,300
July	146.30	127.38	7	71,700	29	3,670	14,000	860,000	456,499	1,240,000	152,000
Aug.	133.87	127.38	31	21,700	5	3,570	8,460	520,000	418,051	1,280,000	165,000
Sept.	145.09	132.59	9	72,900	26	14,400	30,600	1,821,000	1,092,909	3,723,800	147,000
Oct.	137.70	129.15	7	37,000	31	6,760	15,600	959,000	807,694	2,852,270	204,000
Nov.	132.73	127.95	9	20,800	30	5,010	6,620	334,817	334,817	829,260	156,000
Dec.	128.05	127.30	2	5,140	28	4,400	4,680	288,000	277,897	625,260	143,000
Yearly	146.30	125.65		72,900		2,000	9,600	6,947,000	5,261,258	9,554,530	2,643,000

† Estimated * Partly Estimated † Includes San Juan water which by-passed this station in 1932 & 1938.

RIO GRANDE AT HIDALGO STATION

DESCRIPTION: Water-stage recorder on the downstream side of the United States end of the Hidalgo-Reynosa international bridge near 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 United States Coast and Geodetic Survey mean sea level datum. Meter measurements are from the bridge.

RECORDS: Discharges based upon 57 meter measurements during the year. Discharge computations by shifting channel methods. Discharge 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 only during peaks in 1940, 1941 and 1942.

REMARKS: On July 28, 1941 the zero of the gage was changed to U.S.C. & G.S. mean sea level 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. All gage heights reported here for 1942 are on this new datum. 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 at this station, 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 Jardin de Flores at stages about 3.5 feet lower. The bottom of the river at this station is subject to considerable erosion during floods. See Water Bulletin No. 3, page 38.

EXTREME FLOWS: The highest recorded stage was in 1909 when 106.92 feet on the present gage was reached. In 1910, 103.85 was reached. These were before the present river bridge and highway embankments were constructed at this point. In 1932 the peak stage was 104.88 and the peak flow was 83,870 second feet. See previous Water Bulletins and Special Flood Report 1932 by the United States Section.

Mean Daily Gage Height in Feet — 1942

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	85.66	84.43	84.36	82.12	82.78	86.49	88.62	85.55	91.06	91.96	86.95	84.75
2	85.51	84.23	84.19	82.02	83.53	86.27	87.52	85.53	91.00	92.21	86.53	84.71
3	85.52	83.96	83.80	82.00	83.64	86.35	87.83	84.99	93.21	92.34	86.28	84.69
4	85.53	83.81	83.66	82.07	82.72	86.45	89.86	84.50	93.16	92.54	86.15	84.64
5	85.46	83.86	83.62	82.48	82.22	86.50	96.08	84.38	92.20	93.86	86.07	84.69
6	85.50	83.91	83.58	82.09	82.26	86.54	94.46	84.46	93.57	95.50	85.96	85.13
7	85.50	84.01	83.54	81.81	82.42	86.53	97.56	84.34	94.22	94.71	85.91	84.90
8	85.47	84.09	83.68	81.74	83.10	86.22	99.34	84.96	94.48	95.72	86.11	84.59
9	85.32	83.85	83.17	81.67	83.59	86.20	98.80	87.34	96.97	94.51	87.60	84.35
10	85.28	83.69	82.98	81.63	84.33	86.16	94.44	87.51	98.98	93.03	89.83	84.47
11	85.26	83.79	82.84	83.00	85.16	86.43	92.12	86.52	99.58	91.97	87.62	84.62
12	85.19	83.96	82.62	84.68	85.18	86.43	90.60	85.14	98.74	90.55	86.58	84.42
13	85.11	83.81	82.68	83.83	84.83	86.00	89.50	84.60	98.20	89.48	86.28	84.71
14	85.07	83.93	82.89	82.90	84.77	85.92	88.87	84.23	98.73	88.91	86.12	84.48
15	85.17	84.08	83.33	82.37	84.70	85.76	88.80	84.03	99.27	88.63	86.35	84.23
16	85.09	83.84	82.89	81.90	84.61	85.42	88.77	84.39	99.79	88.49	86.00	84.19
17	85.10	83.86	82.59	81.71	84.59	85.26	88.44	84.35	99.85	88.47	85.68	84.19
18	85.15	83.76	82.62	81.71	84.54	85.96	87.93	84.35	99.71	89.20	85.67	84.17
19	85.20	83.90	82.56	82.08	84.85	86.59	87.47	84.77	96.94	89.44	85.70	84.34
20	85.26	84.11	82.54	81.73	86.50	86.30	87.10	85.68	94.20	88.96	85.72	84.65
21	85.12	84.25	82.80	81.63	95.42	86.36	86.81	88.08	93.40	89.55	85.86	84.56
22	84.88	84.30	83.24	81.58	96.52	86.29	86.52	89.39	93.85	90.60	86.12	84.23
23	84.93	84.33	82.96	82.66	91.40	86.35	86.23	88.60	92.34	89.26	85.84	84.15
24	84.89	84.24	82.49	85.84	88.70	89.45	86.60	87.50	91.71	88.48	85.59	84.35
25	84.86	84.21	82.37	85.25	87.52	93.48	87.73	87.27	91.57	88.28	85.56	84.87
26	84.71	84.34	82.30	84.65	87.59	95.22	86.57	88.00	90.75	87.92	85.80	85.01
27	84.60	84.29	82.21	83.90	87.88	95.25	85.51	89.97	90.88	87.66	85.42	85.06
28	84.44	84.29	82.35	83.22	87.14	93.51	85.10	90.30	91.19	87.44	85.17	84.64
29	84.51		82.83	82.91	86.90	91.17	84.78	89.87	91.20	87.23	85.41	84.30
30	84.49		82.34	82.92	87.03	90.06	84.71	91.00	91.49	87.18	85.05	84.14
31	84.45		82.11		87.02		85.41	91.64		86.96		84.12

Sum

Month	1942					Period 1924-1942					
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acrc Feet	Acrc Feet			
	High	Low	Day	High	Low			Normal	Maximum	Minimum	
Apr.					10	1,850					
Apr.					21	1,990					
Apr.					23	1,890					
May	97.33		22	41,600							
June	95.50		27	38,600							
July	96.45		5	42,500							
July	99.65		9	53,000							
Sept.	99.64		11	52,800							
Sept.	100.27		17	52,000							
Oct.	95.71		6	34,500							
Oct.	95.91		8	35,000							
Yearly	100.27	81.51		53,000		1,850					

† Estimated * Partly Estimated

RIO GRANDE FLOODWAY DISCHARGES IN THE LOWER RIO GRANDE VALLEY

On The United States Side—1942

There are three floodways on the United States side of the Rio Grande delta which divert excess Rio Grande flood waters to the Gulf of Mexico. Such floodway discharges are measured at gaging stations known as North Floodway South of McAllen, South Floodway South of McAllen, and Rancho Viejo Floodway near Brownsville. The first two of these gaging stations are described in Water Bulletin No. 2, page 41. The third one is described in Water Bulletin No. 6, page 41.

In 1942 a small amount of Rio Grande flood water passed through these floodways as shown below:

* North Floodway South of McAllen, Texas ** South Floodway South of McAllen, Texas

Date	Second Feet	Extreme High		Acre Feet Total	Date	Second Feet	Extreme High		Acre Feet Total
		Gage Ft.	Second Ft.				Gage Ft.	Second Ft.	
Sept. 17	29.8			59.0	Sept. 17	80.0			159
" 18	46.5	9.50	50.0	92.0	" 18	290.0	14.82	336	575
" 19	28.0			56.0	" 19	108			214
Period		9.50	50.0	207	Period		14.82	336	948

* The amounts shown include the normal drainage water flow of about 20 c.f.s.

**The amounts shown include the normal drainage water flow of about 25 c.f.s.

Rancho Viejo Floodway Near Brownsville, Texas

Date	Second Feet	Date	Second Feet	Date	Second Feet	Month	Extreme High		Acre Feet Total
							Gage Ft.	Second Ft.	
July 6	* 45.0	Sept. 11	* 123	Sept. 16	* 425	July	" 42.88	" 308	* 2,160
" 7	* 208	" 12	* 300	" 17	* 412				
" 8	* 168	" 13	* 400	" 18	* 340				
" 9	* 200	" 14	* 418	" 19	* 230				
" 10	* 290	" 15	* 430	" 20	* 10				
" 11	* 158					Sept.	" 44.05	" 430	* 6,120
" 12	* 20.0								
						Period	" 44.05	" 430	* 8,280

" Estimated

* Partly Estimated

North Floodway Near Sebastian, Texas—1942

The channel of the North Floodway in the vicinity of Sebastian, Texas, serves as a drainage channel as well as a floodway. During 1942 an average of two measurements per month was made of this drainage and flood flow. From these measurements and rainfall records the following table of estimated drainage flow was made. The salt burden carried by this drainage flow will be found elsewhere in this bulletin under the heading, "Chemical Analyses of Water Samples".

Estimated Discharge

Mean Daily Second Feet—1942				Acre Feet			
Month	Maximum	Minimum	Average	Total 1942	Period 1940-1942		
					Maximum	Minimum	Average
January	70.0	17.7	22.7	1,400	7,450	1,400	4,425
February	50.0	18.7	29.0	1,610	6,010	1,610	3,810
March	32.6	27.6	30.6	1,880	5,380	1,880	3,630
April	41.4	31.8	37.1	2,210	5,900	2,210	4,055
May	218	18.8	46.9	2,890	24,200	2,890	15,545
June	460	24.5	121	7,170	9,090	7,170	8,130
July	293	19.7	56.7	3,480	7,170	3,480	5,325
August	24.5	20.6	23.6	1,450	1,900	1,450	1,675
September	90.0	15.0	25.6	1,520	4,740	1,520	3,130
October	70.0	27.2	39.9	2,450	2,450	136	1,639
November	140	34.2	40.7	2,420	2,420	861	1,557
December	39.6	35.8	37.8	2,320	4,480	2,200	3,000
Yearly	460	15.0	42.5	30,800	77,760	30,800	53,921

On The Mexican Side—1942

During the flood period of July 6 to 12 the town of Rio Rico, Tamaulipas, was inundated and there was considerable overflow of lands below Lower Brownsville gaging station on both sides of the river.

At about midnight September 16, 1942, there was a break in the main Mexican Levee about 19 miles upstream from Matamoros. Estimates of flow through this break are as follows: morning of Sept. 17, between 4,000 and 5,000 second feet; on Sept. 18, about 5,500 second feet. Flow through this break was thought to be of short duration. Large areas were inundated on both sides of the river downstream from Brownsville and Matamoros.

The gates of Floodway No. 3 were opened in the late afternoon of September 19, 1942, and closed on September 26, 1942. During this period a large but undetermined amount of water passed through reaching a maximum estimated flow of 3,000 second feet at a gage height of 10.15 meters on September 21, 1942.

Flow began again into this floodway on the night of October 5, 1942. Estimates of this flow for the next few days were made as follows: October 6, 1942, 2,000 second feet; October 8, 1942, 4,000 second feet and October 12, 1942, 300 second feet. Flow again ceased in Floodway No. 3 at about 10:00 P.M. October 13, 1942. At this time the gage reading at the Matamoros gaging station was 4.50 meters and 11.97 feet at the Weather Bureau gage at Brownsville.

RIO GRANDE AT MATAMOROS STATION

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

RECORDS: Based upon 160 meter measurements during the year. The river bottom shifts greatly at this station. Computations by shifting channel methods. 1942 records good. Records available: 1901 to 1913; 1923 to December 1942.

REMARKS: The river flow at this station is greatly modified by many irrigation diversions and by large reservoirs in the United States and Mexico. 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. In May 1924 a recorder was established .6 mile upstream from the bridge. In September 1925 the recorder was moved to its present location. On October 3, 1930 the zero of the gage was lowered 5 feet.

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. The highest gage reading was on October 2, 1936, when a reading of 22.57 feet, present gage, was reached, with a discharge of 29,600 second feet. In 1930 the river at this station was dry for a few days in March and April. On June 17, 1938, the minimum flow was 9.5 second feet with a stage of 1.44 feet.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,050	3,640	3,490	901	1,300	5,510	13,840	3,780	18,400	16,490	6,220	3,850
2	4,800	3,600	3,780	953	1,170	5,050	10,450	4,410	17,020	17,410	5,930	3,400
3	4,770	3,180	3,430	929	1,490	4,700	8,300	4,630	17,730	18,260	5,440	3,260
4	4,840	2,920	3,120	837	1,900	4,520	8,230	4,200	21,890	18,890	5,090	3,070
5	4,840	2,900	2,920	856	1,560	4,420	17,620	3,570	22,500	19,530	5,190	3,190
6	4,560	2,960	2,700	1,220	1,210	4,590	26,590	3,470	21,190	22,570	5,160	3,250
7	4,660	3,050	2,690	1,200	1,030	4,910	26,730	3,600	24,860	22,880	5,050	3,670
8	4,840	3,100	2,640	886	1,470	5,020	27,580	3,600	26,060	23,020	5,470	3,570
9	5,090	3,220	2,700	703	2,070	4,590	28,500	3,810	25,780	23,480	6,140	3,330
10	5,160	2,970	2,510	600	2,590	4,240	29,030	5,690	27,790	21,890	9,920	3,080
11	5,230	2,970	2,000	523	3,180	3,880	28,780	6,780	29,590	19,110	14,160	2,980
12	5,190	2,990	1,760	629	3,880	3,600	22,040	5,650	29,980	16,310	9,040	2,880
13	4,940	3,110	1,600	1,950	4,310	3,710	14,830	4,590	30,050	13,950	6,600	3,070
14	4,910	3,110	1,450	2,300	4,170	3,570	11,800	3,880	30,970	11,550	5,690	3,310
15	5,010	3,290	1,530	1,850	3,880	3,300	10,200	3,470	31,850	10,350	5,330	3,050
16	5,050	3,450	1,790	1,380	3,850	3,040	9,710	3,430	32,310	9,500	5,440	2,760
17	5,050	3,130	1,680	1,030	3,880	2,800	9,460	3,410	31,850	8,900	5,050	2,530
18	5,120	2,890	1,400	696	3,810	2,560	8,580	3,250	31,080	8,980	4,480	2,520
19	5,090	2,940	1,130	826	3,740	2,550	7,420	2,950	28,850	10,140	4,240	2,460
20	4,870	3,110	1,070	1,200	3,570	3,240	6,360	3,160	25,320	10,590	4,240	2,650
21	4,980	3,500	1,090	1,050	7,910	3,670	6,220	3,640	20,980	9,820	4,340	3,450
22	4,980	3,810	1,090	901	24,120	4,380	5,970	6,390	19,110	11,970	4,660	3,220
23	4,800	3,990	1,230	982	25,780	5,760	5,190	10,310	18,580	14,300	4,870	2,680
24	4,660	3,850	1,320	1,050	16,210	6,000	4,800	9,610	16,070	11,550	4,590	2,620
25	4,730	3,520	1,200	2,280	10,170	14,370	4,840	7,350	15,010	9,850	4,170	3,050
26	4,480	3,340	1,050	3,570	7,200	23,380	6,000	6,710	14,510	8,830	4,310	3,500
27	3,850	3,290	999	3,300	6,570	27,330	6,110	8,550	13,280	8,260	4,800	3,740
28	3,640	3,080	879	2,550	7,240	26,940	4,840	14,270	14,200	7,770	4,630	3,710
29	3,500		911	1,870	6,220	22,210	3,990	14,200	15,190	7,240	4,240	3,310
30	3,410		939	1,400	5,400	16,880	3,780	14,270	15,260	6,820	4,170	3,000
31	3,350		1,050		5,470		3,640	16,740		6,460		2,650
Sum	145,450	90,910	57,148	40,424	176,280	230,720	381,430	193,370	687,260	426,670	168,660	96,790

Month	1942						Period 1924-1942				
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day			Low	Normal	Maximum	Minimum
Jan.	8.73	6.40	11	5,230	31	3,300	4,690	288,500	227,913	490,800	92,240
Feb.	7.55	5.81	23	4,030	18	2,860	3,250	180,300	106,507	328,300	28,470
Mar.	7.12	2.59	2	3,810	28	858	1,840	113,400	130,664	240,800	27,860
Apr.	7.35	1.90	26	3,740	11	491	1,350	80,180	122,705	317,800	56,890
May	20.41	2.76	23	26,600	7	932	5,690	349,700	319,737	721,100	99,390
June	21.03	5.35	27	27,900	19	2,460	7,690	457,600	416,588	1,180,500	31,690
July	22.05	7.28	10	29,600	31	3,600	12,300	756,600	359,210	756,600	54,420
Aug.	15.81	6.00	31	18,200	19	2,900	6,240	383,500	317,042	833,700	73,180
Sept.	22.51	14.73	16	32,300	27	13,100	22,900	1,363,200	665,618	1,363,200	124,070
Oct.	19.36	9.91	9	23,700	31	6,390	13,800	846,300	614,658	1,408,500	124,280
Nov.	13.58	7.41	11	14,800	25	4,100	5,620	334,500	306,220	827,500	95,740
Dec.	7.51	5.22	1	4,330	19	2,420	3,120	192,000	234,060	594,200	69,710
Yearly	22.51	1.90		32,300		491	7,384	5,345,780	3,874,922	6,579,500	1,969,810

RIO GRANDE AT LOWER BROWNSVILLE STATION

DESCRIPTION: Water-stage recorder and cable with stand-up cable car and winch, located about 1,000 feet below the El Jardin 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 gage is on United States Coast and Geodetic Survey mean sea level datum.

RECORDS: Based upon 62 current meter measurements, 60 by the United States and 2 by the Mexican Section, made during the year. Computations by shifting channel methods. 1942 records good. Records available January 1934 to December, 1942.

REMARKS: The river flow at this station is greatly modified by many irrigation diversions, drainage returns, and large reservoirs in the United States and Mexico. 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. Additional data concerning peaks may be found in previous Water Bulletins. The river was dry at this station a few days in 1930 and March 25-28, 1935; also June 16-19, 1938, and several days in 1940.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,760	3,600	3,410	* 788	1,300	5,400	12,900	3,670	*18,100	17,000	6,180	3,780
2	4,740	3,600	3,740	807	1,130	5,000	10,500	4,280	17,600	17,900	5,770	3,310
3	4,700	3,590	3,440	792	1,260	4,510	8,250	4,580	18,300	18,900	5,270	3,110
4	4,800	3,570	3,080	756	1,770	4,320	8,100	4,260	22,200	19,700	4,970	2,940
5	4,800	2,790	2,860	772	1,550	4,220	16,400	3,490	23,100	20,300	5,070	3,060
6	4,550	2,820	2,600	1,100	1,220	4,330	27,300	3,380	22,000	21,800	5,040	3,170
7	4,630	2,980	2,600	1,080	946	4,800	27,900	3,510	24,300	22,000	4,950	3,570
8	4,810	3,000	2,570	822	1,220	4,910	28,600	3,460	25,800	22,000	5,130	3,450
9	5,040	3,100	2,630	* 562	1,850	4,420	28,900	3,780	26,700	22,500	5,460	3,410
10	5,110	2,880	2,370	* 496	2,350	4,090	28,900	3,500	27,800	21,600	8,410	3,030
11	5,140	2,830	1,860	* 484	2,900	3,760	28,600	6,640	28,700	19,400	13,000	3,020
12	5,090	2,880	1,620	582	3,540	3,550	23,800	5,560	29,500	17,000	9,680	2,880
13	4,860	2,990	1,500	1,800	4,190	3,580	15,500	4,520	30,400	14,500	6,640	2,910
14	4,760	3,050	1,330	2,150	4,100	3,460	11,200	3,780	30,800	11,600	5,500	3,070
15	4,880	3,160	* 1,380	1,660	3,780	3,140	9,850	3,460	30,400	10,200	5,030	2,880
16	4,910	3,370	* 1,590	1,190	3,690	2,880	9,700	3,380	30,000	9,400	5,140	2,640
17	4,930	3,120	1,580	885	3,750	2,670	9,300	3,380	27,500	8,870	4,900	2,440
18	4,960	2,820	1,300	634	3,700	2,400	8,500	3,250	27,200	8,880	4,430	2,420
19	4,940	2,850	* 1,020	727	3,640	2,280	7,300	2,890	25,200	9,630	4,070	2,350
20	4,740	2,970	* 975	1,090	3,430	2,860	6,300	3,000	23,700	10,200	4,150	2,570
21	4,770	3,310	992	933	6,720	3,450	6,180	3,510	21,200	9,920	4,340	3,270
22	4,820	3,650	* 1,020	762	21,900	4,070	5,870	6,040	19,300	11,500	4,590	3,110
23	4,670	3,890	* 1,170	844	27,000	5,690	5,180	10,000	19,000	13,600	4,730	2,560
24	4,480	3,880	1,210	939	18,000	5,740	4,780	9,470	16,400	11,100	4,470	2,540
25	4,550	3,660	* 1,020	1,910	10,300	12,500	4,860	7,470	15,000	9,460	4,070	2,890
26	4,440	3,380	* 930	3,870	7,000	22,300	5,880	6,530	14,500	8,560	4,180	3,300
27	3,830	3,310	* 868	3,870	6,250	26,000	5,980	7,710	13,300	8,150	4,430	3,480
28	3,450	3,130	* 714	3,130	6,710	26,400	5,070	12,700	14,300	7,700	4,460	3,510
29	3,410		* 782	2,350	5,950	23,600	3,920	13,400	15,700	7,140	4,120	3,240
30	3,280		* 843	1,740	5,090	16,900	3,590	*13,500	16,200	6,730	4,080	2,910
31	3,290		* 882		5,190		3,560	*15,700		6,370		2,560
Sum	142,140	90,180	*53,886	39,525	171,426	223,230	382,670	185,800	674,200	423,610	162,260	93,380

Month	1942						Period 1934-1942				
	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	High	Day	Low			Normal	Maximum	Minimum	
Jan.	19.50	17.03	11	5,160	31	3,250	4,590	282,000	200,467	299,000	88,200
Feb.	18.04	16.42	23	3,940	6	2,750	3,220	179,000	145,589	237,000	26,300
Mar.	17.87	*12.70	2	3,780	28	* 710	*1,740	*107,000	127,922	199,000	29,700
Apr.	18.06	11.88	26	4,260	11	463	1,320	78,400	109,533	242,000	50,500
May	31.36	15.08	23	27,500	7	880	5,530	340,000	356,222	717,000	110,000
June	31.89	15.84	28	26,500	19	2,220	7,440	443,000	427,556	*1,161,000	32,000
July	32.47	18.23	‡ 9	29,200	31	3,360	12,300	759,000	399,100	759,000	65,900
Aug.	*27.10	17.14	31	*17,200	20	2,810	5,990	369,000	291,656	679,000	77,900
Sept.	33.24	26.10	14	31,000	27	13,100	22,500	1,337,000	676,667	1,337,000	150,000
Oct.	30.34	21.03	9	22,700	31	6,300	13,700	840,000	566,000	*1,427,000	200,000
Nov.	24.76	18.39	11	13,400	20	4,060	5,410	322,000	242,911	614,000	94,200
Dec.	18.48	16.35	1	4,020	19	2,260	3,010	185,000	192,956	341,000	64,800
Yearly	33.24	11.88		31,000		463	7,240	5,241,400	3,736,579	6,526,000	1,911,600

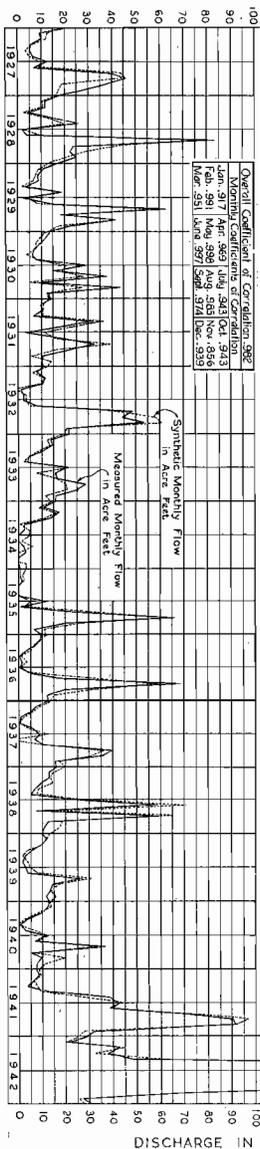
* Partly Estimated ‡ And Other Days

ESTIMATED RIVER FLOW, WATERSHED YIELDS, CHANNEL LOSSES, BANK STORAGE AND RETURN, AND IRRIGATION CONSUMPTION Primarily Between Fort Quitman and Upper Presidio and secondarily Elsewhere on the Rio Grande Basin above Presidio.

The following equations are applicable to the Rio Grande watershed and river channel from Fort Quitman to Upper Presidio. They were developed from the rainfall, temperature, and irrigated area data for this watershed shown elsewhere in this bulletin, and from the authenticated Rio Grande discharge data for the years 1927 to 1942 at Fort Quitman, and at Upper Presidio, and referred to on the last pages of this bulletin. These equations with their coefficients and constant were developed by the method of least squares or other methods of balancing so that cumulative errors were avoided. The year 1934 had very small rainfalls and very high temperatures, the year 1941 had very large rainfalls, and the year 1942 was one of very large flows originating outside of this watershed subdivision. It is thus seen that a very wide range was experienced from 1927 to 1942 in the different variables of the equations.

By means of these equations the flow at Upper Presidio can be calculated from the known flow at Fort Quitman, or by successive approximations the flow at Fort Quitman can be calculated from the known flow at Upper Presidio. The values of the constant and coefficients of the equations are tabulated below and the appropriate data on rainfall, temperature and irrigated area will be found elsewhere in this bulletin.

The reliability of this method of calculating the flow at Upper Presidio is indicated by the accompanying graph covering the years 1889 to 1942, and showing the actually measured flow each month at Upper Presidio and the synthetic flow computed by the equations. The coefficients of correlation between measured and computed values are shown on the graph.



The monthly flows at Upper Presidio (U) from January 1889 to April 1900, and April 1914 to August 1919, and April 1920 to December 1926, inclusive, shown on pages 47 and 48 of this bulletin, were computed by these equations and the appropriate data mentioned above and from known monthly flow at Fort Quitman (F). Such Fort Quitman flows shown on pages 46 and 47 herein were computed in a similar manner from the measured monthly flows at El Paso for the periods 1889 to April 1900, inclusive, April 1914 to August 1919, inclusive, and from April 1920 to December 1922, inclusive. The Fort Quitman flows from May 1900 to March 1914, inclusive, and from September 1919 to March 1920, also shown herein, are the average of the flow calculated by the above equations from known flows at Upper Presidio and by similar methods from known flows at El Paso.

The monthly amounts of river water consumed (I) on farming land from Fort Quitman to Upper Presidio were computed from the equations for I and the appropriate data mentioned above. These amounts are shown on page 50 herein for the years 1889 to 1942. Similar amounts similarly arrived at by a somewhat different method for the Rio Conchos watershed will be found on the same page.

The monthly watershed yields (Y) from the 3,010 square miles from Fort Quitman to Upper Presidio were computed from the equations for Y, shown below, and the appropriate data mentioned above. These amounts are shown on page 50 herein for the years 1889 to 1942. Arroyo inflow from El Paso to Fort Quitman and watershed yields for the Rio Conchos basin depending upon rainfall but computed by different methods are also shown on page 50.

The monthly amount of channel losses (L) along the 205 miles of river channel from Fort Quitman to Upper Presidio were computed from the equations for L and the appropriate data mentioned above. These amounts are shown on page 51 herein for the years 1889 to 1942.

Monthly amounts (B) of bank storage (-) and bank return (+) for those years from 1889 to 1942, when F was 70,000 feet or greater, are shown on page 51 herein. These positive and negative values approximately offset each other within each year.

- $U = F + Y - L + B - I$ in which:
 F = Monthly acre feet flow at Fort Quitman.
 U = Monthly acre feet flow at Upper Presidio with the month so timed as to encompass the same water as F.
 Y = Monthly acre feet of watershed yield to the river.
 L = Monthly acre feet of river water lost by evaporation, bank vegetation and channel seepage.
 B = Monthly acre feet of river bank storage (-) and river bank return (+) in flood time.
 I = Monthly acre feet of water consumed from the measured monthly flows at El Paso or F_1 or F_2 more or less.
 $L = 5,000 [c (T - 40^\circ) - R] + 2,100 + .12 F$, except as follows:
 $L = 5,000 [c (T - 40^\circ) - R] + 2,100 + .12 F + .77 (T - 110,000)$. This equation applies only when $F_2 > 110,000$ and when $F_1 < 110,000$ and $F_2 < 30,000$ and all previous values of F for over 3 years have been less than 70,000. (This occurred in 1935).
 A = Total acreage irrigated each year.
 T = Mean monthly temperature (degrees Fahrenheit).
 R = Mean monthly rainfall in feet depth on the valley floor = 92.5% of watershed rainfall.
 B = Mean monthly rainfall on the watershed, expressed in inches depth.
 X = Sum as R, but only that in excess of 6 inches.
 I = Monthly acre feet net loss from the river for evaporation and transpiration from farming land I = 0 in the winter months, November through February, when $A > 15,000$ and in other months when $F + Y = 0$.
 $I = A [c (T - 40^\circ) - R]$ in the summer months when $A > 15,000$ and $F > 0$.
 $I = A [1/3 (17,500 - A)] [c (T - 40^\circ) - R]$ in the summer months when $A < 15,000$ and $F > 0$.
 $I = [1/3 (17,500 - A)] [c (T - 40^\circ) - R]$ when $F = 0$ and $Y > 0$ and for those winter months when $A < 15,000$.
 $I = [1/3 (17,500 - A)] [c (T - 40^\circ) - R] + [1/4 (17,500 - A)] [c_1 (T_1 - 40^\circ) - R_1]$ when $F_1 + Y_1 = 0$.
 When L + I, computed by the above equations, is greater than F + Y - U, then the final values of L and I are adjusted by judgement to make $L + I = F + Y - U$.
 $Y = K + X (.00917 R_0^2 + .03166 R_0 + .01667 R_1 + .0108 R_2 + .0083 R_3 + .0067 R_4 + .0042 R_5 + .0033 R_6 + .0017 R_7)$

Subscripts 0, 1, 2, etc. indicate the current month, first preceding month etc. respectively. The coefficients c, c, k and the constant K have the following monthly values:

Month	c	C	K	k	Month	c	C	K	k
Jan.	.010		-2,000	62,620	July	.0199	.0250	-4,000	306,967
Feb.	.010		0	45,826	Aug.	.0172	.0167	-4,000	207,508
Mar.	.0094	.010	0	85,028	Sept.	.0104	.0225	-5,000	143,697
Apr.	.0167	.010	1,500	69,948	Oct.	.0050	.010	-20,000	259,769
May	.0129	.0167	3,000	115,780	Nov.	.010		0	43,752
June	.0118	.0208	3,000	143,781	Dec.	.010		0	28,695

DISCHARGE IN THOUSANDS OF ACRE FEET

ESTIMATED AND MEASURED FLOWS - IN ACRE FEET

Estimated Flows for Early Years Along the Rio Grande From San Marcial to Lower Presidio Also Previously Unpublished Flows of the Rio Conchos Together with Long Term Normal Annual and Monthly Flows

Immediately following will be found estimated monthly and annual discharges of the Rio Grande at five principal gaging stations from San Marcial, New Mexico, to the Lower Presidio gaging station in Texas, also estimated monthly and annual discharges of the Rio Conchos at La Boquilla and at Ojinaga, Chihuahua, Mexico. For each station these records are supplemental to those determined from measurements of flow at the station and published and authenticated herein or in previous Water Bulletins. The authenticated measured records and these estimated records together constitute a continuous monthly or annual record from the earliest date now feasible down to the present time. At the end of page 49 will be found the long term monthly and annual normal flows for each of these stations. These normals cover both the measured and estimated records.

These estimates for San Marcial and El Paso were monthly distributions of lump sum estimates reported in W. B. No. 7, p. 51, and were made in accordance with the normals and with the appropriate rainfall records. For Fort Quitman and Upper Presidio these estimates are made as outlined on the preceding page of this bulletin. For the Rio Conchos at Boquilla and Ojinaga the values for the years 1896 to 1900 were based upon the relationship to flow in the Rio Nazas at San Fernando Dam. The estimates after 1900 were based upon weightings of several relationships including rainfall and the net water yield from adjacent watersheds on the Rio Conchos or Rio Grande. Also taken into account was the Rio Grande flow at downstream points when known. For Lower Presidio the estimates were made by combining the estimated flow at Upper Presidio and the Rio Conchos at Ojinaga, with due regard for small uses on intervening farm land.

For the last 5 months of 1923 and all months of the years 1924, 1925 and 1926 the estimated records are substituted for the original records at Upper Presidio, Lower Presidio and Rio Conchos as the original records were found to be erroneous. This was also true for the last 5 months of 1914, the first 7 months of 1915, the last 4 months of 1919, and the first 3 months of 1920 at Lower Presidio.

Because of a broader basis for these estimates, the monthly records for Lower Presidio and the Rio Conchos at Ojinaga, for the years 1927 through 1931 and the first 4 months of 1932, were changed from those shown in W. B. No. 7, p. 44, as the original measured records were found to be correct.

Previously unpublished records of the flow of the Rio Conchos at Boquilla are shown here. The table differentiates the measured from the estimated records.

San Marcial

Month	1895	1896	Month	1895	1896	Month	1895	1896
Jan.	" 60,000	* 43,000	May	@ 222,892	@ 124,143	Sept.	" 14,000	@ 7,735
Feb.	@ 53,760	@ 39,114	June	@ 233,375	@ 9,759	Oct.	" 39,000	@ 45,624
Mar.	@ 128,879	@ 41,750	July	@ 149,476	@ 28,653	Nov.	" 63,000	@ 12,444
Apr.	@ 279,014	@ 186,962	Aug.	@ 179,113	@ 7,255	Dec.	" 24,000	@ 38,060
						Total	* 1,446,509	* 584,499

El Paso

Month	1889	1893	" 1894	" 1895	" 1896	♠ January 1898						1915
						Day	S.F.	Day	S.F.	Day	S.F.	
Jan.	" 15,160	@ 8,240	8,800	21,000	6,500	1	490	12	510	23	440	@ 39,300
Feb.	" 14,900	@ 7,990	8,640	20,600	6,400	2	470	13	550	24	450	@ 32,000
Mar.	" 28,800	@ 2,150	16,700	39,500	12,300	3	470	14	660	25	430	@ 22,200
Apr.	" 66,100	@ 48,100	38,300	91,000	28,230	4	450	15	470	26	420	@ 37,800
May	" 190,300	@ 231,000	110,300	261,800	81,300	5	470	16	450	27	410	@ 143,000
June	@ 157,000	@ 13,400	100,520	238,800	74,150	6	500	17	490	28	400	@ 184,000
July	@ 14,600	" 21,280	41,400	98,400	30,560	7	660	18	550	29	360	@ 76,700
Aug.	@ 0	" 7,640	14,900	35,300	11,000	8	650	19	720	30	350	@ 88,300
Sept.	@ 0	" 5,940	11,540	27,400	8,500	9	630	20	590	31	210	@ 59,900
Oct.	@ 0	" 13,420	26,100	62,000	19,230	10	620	21	520			@ 19,500
Nov.	@ 0	" 6,320	12,300	29,200	9,100	11	540	22	440			@ 1,930
Dec.	@ 4,370	" 5,400	10,500	25,000	7,730							@ 28,500
Total	* 491,230	* 370,880	400,000	950,000	295,000	Total Second Foot Days 15,370						* 733,130
						Monthly Mean Sec. Feet 496						
						Total Acre Feet 30,500						

Fort Quitman

Month	" 1889	" 1890	" 1891	" 1892	" 1893	" 1894	" 1895	" 1896	" 1897
Jan.	12,200	7,350	22,400	17,600	3,100	5,900	15,500	5,700	12,800
Feb.	8,200	7,350	20,900	19,000	3,400	4,500	14,100	2,650	5,400
Mar.	14,200	7,500	82,200	24,500	390	4,750	19,200	500	200
Apr.	41,200	88,500	162,000	124,000	7,880	13,000	68,000	5,000	73,100
May	92,500	285,000	420,000	318,000	170,000	51,000	238,000	30,000	260,000
June	88,000	212,000	335,000	125,000	2,500	45,000	161,000	33,000	359,000
July	3,000	26,000	70,000	4,750	2,580	8,500	45,000	12,200	49,000
Aug.	100	10,100	2,250	0	3,470	550	7,200	860	3,410
Sept.	1,080	7,000	0	0	1,740	880	11,500	1,750	28,000
Oct.	150	340	77,200	0	2,250	8,380	36,000	10,900	71,200
Nov.	150	6,200	9,900	0	1,600	3,300	23,000	2,200	24,800
Dec.	0	21,200	12,200	350	1,150	3,300	15,200	1,600	34,900
Total	260,780	678,540	1,214,050	633,200	200,060	149,560	653,700	106,360	921,810

" Estimated * Partly estimated @ From Water Supply Papers

♠ From original record in I.B.C. files. This differs slightly from the estimate shown in W. S. P. 358

ESTIMATED AND MEASURED FLOWS—IN ACRE FEET

Fort Quitman

Month	" 1898	" 1899	" 1900	" 1901	" 1902	" 1903	" 1904	" 1905	" 1906
Jan.	27,300	8,450	5,100	221	5,760	200	1,580	28,200	21,400
Feb.	24,600	6,450	3,000	1,070	3,080	350	1,580	30,200	28,600
Mar.	14,100	3,750	0	874	780	8,260	1,730	181,000	19,200
Apr.	72,900	3,000	0	469	2,320	28,700	2,040	145,000	68,000
May	120,000	5,500	10,700	65,400	1,680	131,000	1,510	349,000	291,000
June	59,000	540	50,800	47,200	1,080	315,000	4,410	720,000	233,000
July	113,000	8,250	3,020	2,440	4,100	162,000	1,440	37,400	37,400
Aug.	7,400	570	886	27,000	2,700	1,240	2,080	2,540	11,900
Sept.	260	670	7,560	16,600	7,500	2,050	8,300	5,550	1,550
Oct.	20	70	1,230	2,060	733	420	233,000	1,640	11,400
Nov.	50	540	196	6,230	706	346	28,000	10,700	41,800
Dec.	1,900	350	15	4,120	250	810	26,200	39,000	66,800
Total	440,530	38,140	82,507	171,684	30,689	650,356	311,870	1,550,230	832,050

Month	" 1907	" 1908	" 1909	" 1910	" 1911	" 1912	" 1913	" 1914	" 1915
Jan.	59,800	31,600	13,800	29,900	3,790	49,800	10,600	10,500	24,700
Feb.	44,800	27,000	9,700	14,300	4,120	28,100	26,700	8,050	22,000
Mar.	40,800	31,600	11,200	52,800	12,900	33,500	9,650	20,000	14,700
Apr.	148,000	60,600	27,600	89,600	4,900	90,000	16,600	47,800	13,800
May	217,000	84,400	193,000	256,000	173,000	247,000	55,200	197,000	55,200
June	385,000	25,400	171,000	5,640	186,000	476,000	18,700	185,000	71,200
July	293,000	2,480	11,000	0	349,000	78,000	1,170	98,000	50,300
Aug.	69,300	15,400	241	0	16,300	16,800	548	34,900	51,200
Sept.	162,000	7,100	105,000	2,840	3,580	21,400	607	1,140	46,300
Oct.	29,400	34	13,900	2,200	200,000	444	592	39,500	18,300
Nov.	47,200	707	6,710	1,500	74,300	6,550	3,550	38,400	1,910
Dec.	34,600	7,740	13,800	1,140	53,600	22,800	10,100	69,200	6,280
Total	1,530,900	294,061	576,951	455,920	1,081,490	1,070,394	154,017	749,490	375,890

Month	" 1916	" 1917	" 1918	" 1919	" 1920	" 1921	" 1922	" 1923
Jan.	8,440	34,800	11,100	9,680	12,000	9,410	14,300	14,700
Feb.	9,770	36,200	18,100	11,600	6,740	14,900	28,900	21,700
Mar.	12,800	28,200	21,200	20,300	13,600	27,100	28,000	22,400
Apr.	20,900	19,700	15,500	20,800	16,400	17,700	32,900	17,900
May	30,300	23,600	18,100	36,100	23,600	30,500	25,300	21,900
June	44,400	24,000	7,720	25,900	33,800	32,500	24,100	25,000
July	13,400	93,900	4,050	34,800	27,000	39,500	21,500	29,700
Aug.	26,100	55,600	19,000	26,500	47,000	64,000	49,100	59,400
Sept.	15,300	52,700	4,750	45,700	41,300	68,500	46,100	39,300
Oct.	30,800	51,200	26,200	13,600	51,400	67,400	53,500	38,100
Nov.	3,740	33,600	24,900	12,200	24,900	52,600	29,100	18,900
Dec.	35,900	41,000	11,600	5,120	22,900	28,000	22,600	23,400
Total	251,850	494,500	182,220	262,300	320,640	452,110	357,400	332,400

Upper Presidio

Month	" 1889	" 1890	" 1891	" 1892	" 1893	" 1894	" 1895	" 1896	" 1897
Jan.	11,000	4,940	20,200	14,700	928	6,980	13,600	6,990	12,200
Feb.	6,610	4,480	17,300	15,500	1,660	3,340	12,300	2,690	4,000
Mar.	13,100	3,630	64,700	20,000	0	2,430	15,100	0	0
Apr.	32,600	66,600	127,000	95,700	2,320	7,460	55,400	473	53,600
May	72,800	223,000	340,000	251,000	146,000	41,900	203,000	22,100	206,000
June	75,600	189,000	289,000	114,000	12,600	36,700	145,000	28,900	304,000
July	20,400	58,100	80,600	24,200	29,700	12,700	86,600	43,400	103,000
Aug.	6,290	47,400	18,700	17,300	43,900	23,300	53,400	19,600	66,200
Sept.	15,300	23,400	4,980	1,270	22,000	13,800	29,400	18,600	52,800
Oct.	3,990	12,000	55,800	0	12,400	14,100	51,900	39,000	83,200
Nov.	681	6,870	9,500	0	2,680	3,420	24,200	4,020	26,400
Dec.	0	18,900	13,500	495	1,040	2,560	14,500	1,410	33,500
Total	258,371	658,320	1,041,280	554,165	275,228	168,690	704,400	187,183	944,900

Month	" 1898	" 1899	" 1900	" 1914	" 1915	" 1916	" 1917	" 1918	" 1919
Jan.	24,400	6,180	3,870	5,440	27,400	6,280	29,100	10,200	8,440
Feb.	20,400	4,260	1,950	2,140	20,600	7,010	30,200	14,500	9,500
Mar.	11,400	1,060	711	12,000	18,000	9,120	22,200	16,900	19,300
Apr.	56,400	2,830	0	38,300	12,200	14,400	12,200	8,700	16,000
May	95,300	3,380	3,930	160,000	48,700	23,200	17,400	14,100	31,900
June	60,800	3,420	46,800	195,000	57,900	34,800	16,200	7,350	27,100
July	110,000	37,500	9,830	137,000	58,400	10,000	64,800	12,500	46,200
Aug.	38,500	16,800	2,500	82,600	62,200	40,200	77,700	40,300	36,300
Sept.	13,600	10,000	12,100	22,600	61,700	16,700	59,900	6,400	66,100
Oct.	0	1,750	11,100	56,000	25,000	32,200	45,200	23,800	30,300
Nov.	0	1,470	0	38,300	1,980	3,470	29,100	25,200	10,700
Dec.	2,950	216	0	64,700	5,160	30,800	34,700	11,300	2,400
Total	435,750	88,866	92,791	814,080	399,240	228,180	438,700	191,250	304,240

φ From I. B. C. Files. " Estimated * Partly estimated @ From Water Supply Papers

ESTIMATED AND MEASURED FLOWS—IN ACRE FEET

Upper Presidio

Month	1920	" 1921	" 1922	" 1923	" 1924	" 1925	" 1926		
Jan.	7,440	6,620	10,700	10,700	17,100	10,700	12,500		
Feb.	1,780	12,000	23,500	19,100	19,100	12,300	7,400		
Mar.	5,290	21,100	21,700	19,600	24,200	12,900	11,700		
Apr.	11,000	10,500	26,700	10,400	23,600	6,640	18,400		
May	18,500	23,700	21,000	13,400	40,400	14,400	29,300		
June	37,600	34,700	19,700	19,600	19,300	14,400	23,200		
July	25,500	50,100	22,400	28,500	73,900	18,800	66,400		
Aug.	78,700	70,700	43,700	82,600	37,100	74,300	34,100		
Sept.	45,000	65,500	37,600	44,400	42,400	62,400	40,600		
Oct.	55,600	55,700	29,200	46,300	19,200	33,400	44,000		
Nov.	23,400	46,200	25,300	18,400	11,600	13,300	17,600		
Dec.	19,800	23,800	18,100	21,700	16,300	11,400	18,800		
Total	* 329,610	420,620	299,600	334,700	352,100	284,940	324,000		

Rio Conchos at Boquilla, Chihuahua

Year	1896	" 1899, 010	Month	" 1910	" 1911	" 1912	1913	" 1914	" 1915
Year	1897	" 1,474,000	Jan.	14,190	14,750	47,140	13,050	5,590	3,700
Year	1898	" 806,010	Feb.	9,970	12,730	12,700	87,430	5,590	3,780
Year	1899	" 482,010	Mar.	14,110	11,110	7,540	45,210	5,580	3,790
Year	1900	" 716,000	Apr.	18,480	7,130	3,110	5,680	5,550	3,790
Year	1901	" 456,010	May	11,110	18,650	658	1,760	5,550	2,110
Year	1902	" 990,010	June	51,320	65,510	6,570	2,120	55,880	181,680
Year	1903	" 492,000	July	53,510	154,030	46,950	2,340	289,740	70,300
Year	1904	" 1,088,010	Aug.	122,980	104,580	306,600	3,410	212,490	6,490
Year	1905	" 1,394,020	Sept.	138,790	263,480	281,200	5,360	399,500	4,480
Year	1906	" 1,429,010	Oct.	25,210	141,870	34,240	5,470	102,180	4,540
Year	1907	" 760,010	Nov.	17,840	52,700	13,620	4,490	27,910	6,990
Year	1908	" 568,010	Dec.	14,750	18,890	21,140	5,690	3,690	7,030
Year	1909	" 754,010	Total	492,260	865,430	781,468	* 182,010	1,119,250	298,680

Month	" 1916	" 1917	1918	1919	" 1920	1921	1922	1923	1924
Jan.	7,030	7,730	8,570	53,410	18,020	20,400	30,110	31,980	58,500
Feb.	4,600	7,630	8,460	9,460	14,720	26,350	17,360	31,090	37,600
Mar.	4,600	7,950	8,760	9,880	15,790	21,620	24,970	34,270	41,540
Apr.	4,580	10,600	8,980	10,170	16,570	22,890	26,920	37,100	44,460
May	4,560	10,760	9,120	10,410	17,220	23,960	25,920	44,480	46,880
June	4,520	10,700	9,110	10,370	17,200	23,920	21,890	32,570	53,220
July	6,350	8,300	9,150	193,090	14,850	20,870	21,990	38,850	40,800
Aug.	6,870	8,250	169,560	464,650	509,390	20,140	20,250	38,010	40,640
Sept.	7,510	991,390	18,380	333,600	748,080	173,470	18,040	558,670	36,690
Oct.	7,730	22,400	8,850	437,140	29,860	73,770	16,510	38,230	37,250
Nov.	7,700	8,590	8,520	9,460	14,680	20,020	27,750	31,700	45,640
Dec.	7,700	9,420	8,590	9,480	17,150	20,100	31,330	98,060	42,200
Total	73,950	1,103,720	276,050	1,251,100	1,433,530	467,510	282,960	1,015,010	525,420

Month	1925	1926	1927	1928	1929	1930	1931	1932	1933
Jan.	57,620	67,560	82,240	90,560	80,640	42,190	6,720	44,940	35,570
Feb.	51,100	63,950	78,350	86,160	76,140	27,410	19,310	41,150	33,780
Mar.	56,800	71,850	89,990	89,710	80,910	17,070	43,820	48,960	40,520
Apr.	60,940	68,290	85,600	85,190	80,410	23,150	53,500	44,070	38,580
May	64,430	71,220	88,340	90,130	84,740	18,330	69,750	35,120	56,750
June	64,550	72,440	86,550	89,880	83,050	11,960	78,050	18,200	64,600
July	65,540	74,760	88,300	96,330	90,160	14,550	76,160	21,550	64,860
Aug.	548,290	75,380	86,670	94,780	86,970	17,080	62,030	25,890	60,330
Sept.	420,300	71,370	83,680	89,260	75,870	19,420	75,100	29,830	309,620
Oct.	198,030	77,820	88,300	96,560	73,300	8,690	73,210	25,240	128,890
Nov.	51,570	76,470	87,330	93,180	59,260	13,940	61,030	34,880	60,040
Dec.	51,860	81,100	93,160	94,930	55,470	19,710	52,570	38,040	66,350
Total	1,691,030	872,210	1,038,510	1,096,670	926,920	233,300	671,250	407,870	959,890

Month	1934	1935	1936	1937	1938	1939	1940	1941	1942
Jan.	62,520	47,510	36,890	54,050	59,700	64,500	43,120	40,460	46,060
Feb.	59,440	34,120	46,660	48,880	57,040	61,520	38,490	57,100	42,010
Mar.	68,330	39,150	46,350	55,030	55,860	62,230	58,390	63,400	63,190
Apr.	67,360	51,070	47,660	59,770	69,950	66,690	78,320	78,720	78,230
May	81,200	58,060	59,550	65,850	70,720	75,090	68,070	65,510	88,120
June	94,990	50,010	57,190	78,120	61,950	72,670	77,980	58,330	89,340
July	93,650	51,020	59,120	66,020	45,290	67,720	100,690	57,380	93,340
Aug.	81,930	46,380	52,110	66,340	76,880	66,580	72,840	50,210	253,370
Sept.	69,380	24,470	35,650	30,810	677,960	81,960	57,770	236,470	783,170
Oct.	59,770	35,350	36,720	34,280	89,340	76,260	46,420	399,310	123,660
Nov.	49,980	22,890	45,960	33,100	76,850	42,860	24,370	60,880	84,720
Dec.	42,690	25,080	50,070	56,710	58,180	30,610	25,620	56,840	69,820
Total	831,240	485,060	573,930	648,960	1,399,720	768,690	692,080	1,224,610	1,815,030

" Estimated * Partly estimated † From I.B.C. Files

ESTIMATED AND MEASURED FLOWS - IN ACRE FEET

Rio Conchos at Ojinaga, Chihuahua

Month	" 1896	" 1897	" 1898	" 1899	1900	1914	" 1915	" 1916	" 1917
Jan.					27,700	8,160	117,000	4,050	22,000
Feb.					34,700	7,120	76,300	8,760	8,840
Mar.					22,300	6,500	54,100	4,050	4,050
Apr.					8,110	4,050	4,050	4,050	4,050
May					12,900	117,000	80,700	4,050	4,050
June					15,400	444,000	85,000	4,050	4,050
July					270,000	426,000	61,700	22,900	4,050
Aug.					378,000	488,000	27,800	105,000	18,400
Sept.					160,000	532,000	218,000	221,000	1,240,000
Oct.					94,200	396,000	146,000	107,000	206,000
Nov.					24,400	153,000	67,800	29,800	18,200
Dec.					14,600	111,000	65,300	8,510	4,050
Total	1,279,000	2,296,000	1,188,000	716,000	1,062,310*	2,692,830*	1,003,750	523,220	1,537,740

Month	" 1918	" 1919	" 1920	" 1921	" 1922	" 1923	" 1924	" 1925	" 1926
Jan.	4,050	83,300	45,700	38,900	15,900	33,400	147,000	56,700	96,500
Feb.	4,050	6,810	17,700	40,800	4,050	41,600	57,100	48,700	79,600
Mar.	4,050	4,050	4,050	43,800	4,050	31,400	42,500	56,100	68,200
Apr.	4,050	4,050	4,050	9,320	4,050	122,000	30,800	75,400	50,600
May	4,050	4,050	28,900	4,050	12,200	17,600	27,600	148,000	53,800
June	22,600	4,050	61,500	52,900	74,700	36,400	34,000	72,900	52,900
July	4,050	223,000	49,100	42,900	44,600	20,600	15,800	215,000	55,300
Aug.	264,000	759,000	956,000	4,050	18,000	114,000	11,300	601,000	276,000
Sept.	97,300	717,000	1,093,000	207,000	4,050	750,000	78,700	606,000	294,000
Oct.	122,000	284,000	82,000	210,000	24,100	156,000	106,000	279,000	216,000
Nov.	30,700	45,300	38,100	12,600	25,700	76,000	49,900	110,000	106,000
Dec.	33,400	23,400	13,100	18,500	20,300	91,900	46,100	90,200	93,200
Total	594,300	2,158,010	2,373,200	684,820	251,700	1,490,900	646,800	2,355,000	1,442,100

Lower Presidio

Month	" 1896	" 1897	" 1898	" 1899	1900	1914	" 1915	" 1916	" 1917
Jan.					31,600	13,600	144,000	10,300	51,100
Feb.					36,600	9,260	96,900	15,800	39,000
Mar.					23,000	18,500	72,100	13,200	26,200
Apr.					8,110	42,000	15,800	17,900	15,600
May					16,800	277,000	129,000	27,000	21,100
June					62,900	639,000	143,000	38,600	19,900
July					281,000	562,000	119,000	32,200	67,900
Aug.					381,000	570,000	89,600	145,000	95,500
Sept.					173,000	555,000	280,000	238,000	1,300,000
Oct.					106,000	452,000	171,000	139,000	251,000
Nov.					24,400	191,000	69,800	33,300	47,300
Dec.					14,600	176,000	70,500	59,360	38,800
Total	1,466,000	3,241,000	1,622,000	805,000	1,159,010*	3,505,360*	1,400,700	749,600	1,973,400

Month	" 1918	" 1919	" 1920	" 1921	" 1922	" 1923	" 1924	" 1925	" 1926
Jan.	14,200	91,700	53,100	45,500	26,600	44,100	164,000	67,400	109,000
Feb.	18,600	16,300	19,500	52,800	27,600	60,700	84,100	61,000	87,000
Mar.	21,000	23,400	9,340	64,900	25,800	51,000	66,700	69,000	79,900
Apr.	11,900	19,200	14,200	18,900	29,800	132,000	53,500	79,100	68,100
May	17,600	35,400	46,900	27,200	32,700	30,500	67,500	162,000	82,600
June	29,500	30,700	98,600	87,100	93,900	55,500	52,800	86,800	75,600
July	15,300	268,000	73,300	91,700	65,700	47,800	88,500	231,000	210,000
Aug.	303,000	795,000	1,014,000	74,000	60,900	196,000	47,600	675,000	309,000
Sept.	104,000	783,000	1,138,000	272,000	41,600	794,000	121,000	668,000	335,000
Oct.	146,000	314,000	138,000	266,000	53,300	202,000	125,000	312,000	260,000
Nov.	55,900	56,000	61,500	58,800	51,000	94,400	61,500	123,000	124,000
Dec.	44,700	25,800	32,900	42,300	38,400	114,000	62,400	102,000	112,000
Total	781,700	2,458,500	2,699,340	1,101,200	547,300	1,822,000	994,600	2,636,300	1,762,200

Long Term Normals

Month	San Marcial 1895-1942	El Paso 1889-1942	Fort Quitman 1889-1942	Upper Presidio 1889-1942	Rio Conchos		Lower Presidio 1900-1942
					La Boquilla 1910-1942	Ojinaga 1910-1942	
Jan.	41,138	16,829	14,548	12,653	39,304	47,032	60,068
Feb.	43,626	22,160	14,582	12,089	36,730	41,609	56,645
Mar.	65,587	39,707	18,813	14,624	39,645	32,843	48,140
Apr.	137,800	71,584	34,643	24,518	41,518	23,430	42,076
May	308,688	158,796	94,831	74,250	45,761	30,756	86,429
June	252,674	146,587	93,899	79,899	53,224	53,658	124,621
July	84,617	85,890	41,454	51,215	66,593	115,775	165,486
Aug.	49,762	59,212	24,208	40,246	116,918	224,938	267,147
Sept.	44,214	45,049	28,046	35,282	216,689	389,201	429,023
Oct.	55,726	40,921	28,636	33,014	71,406	163,237	198,565
Nov.	39,378	21,830	15,620	16,155	38,695	64,582	83,055
Dec.	41,682	22,888	17,701	16,149	38,910	56,899	75,129
Annual	1,144,892	729,853	426,981	410,034	# 825,180	#1,254,665	#1,647,074

Period 1896-1942

" Estimated

* Partly estimated

φ From I.B.C. Files

WATERSHED YIELDS—THOUSANDS OF ACRE FEET

The yield figures for the various watersheds listed below represent different aspects of run-off. Table 1 below shows merely the estimated arow flow reaching the Rio Grande as surface discharge between El Paso and Fort Quitman. Table 2 below shows the total surface and underground flow reaching the river from the watershed between Boquilla, Fort Quitman and Upper Presidio. This flow was computed by the equation for Y shown on page 6 of this bulletin.

of this bulletin. Table 3 below shows the Rio Grande water passing through plus the estimated water consumed in irrigation and reservoir evaporation below Boquilla, above the Rio Grande flow at Boquilla. This estimated water consumed in irrigation is shown on page 60 of this bulletin. Table 4 below shows annual values of the flow of the Rio Grande reaching Boquilla plus the estimated water consumed above Boquilla which was 7,700 acre feet each year.

Arroyo Flow—El Paso to Fort Quitman

Table 1: Arroyo Flow—El Paso to Fort Quitman. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows: 1889-1940, Total, Normal.

Watershed Yield—Fort Quitman to Upper Presidio

Table 2: Watershed Yield—Fort Quitman to Upper Presidio. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows: 1877-1940, Total, Normal.

Watershed Yield—Boquilla to Ojinaga

Table 3: Watershed Yield—Boquilla to Ojinaga. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows: 1896-1940, Total, Normal.

Watershed Yield—Above Boquilla

Table 4: Watershed Yield—Above Boquilla. Columns: Year, Acre Feet, Year, Acre Feet, Year, Acre Feet, Year, Acre Feet. Rows: 1896-1940, Total.

RIVER CHANNEL LOSSES, BANK STORAGE AND BANK RETURN DURING FLOODS BETWEEN FORT QUITMAN AND UPPER PRESIDIO - 1889 to 1942

CHANNEL LOSSES

Tabulated below are the approximate acre feet of water per month lost to the river flow along the 205 miles of river channel from Fort Quitman to Upper Presidio. These losses were computed in accordance with the equation for L shown on page 45 of this bulletin. These quantities do not include the bank storage and bank return during large floods as shown in the adjoining table on this page.

BANK STORAGE AND BANK RETURN

During floods in the Rio Grande between Fort Quitman and Upper Presidio, when the monthly flow equals or exceeds 70,000 acre feet, then large quantities of water are temporarily absorbed into the banks and overflowed areas. When the flood recedes this water returns to the river as delayed flow. The approximate amounts of this bank storage (-) and bank return (+) are shown in acre feet in the following table. These values were computed by equation for B shown on page 45 of this bulletin.

In Thousands of Acre Feet

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
1889	2.5	3.5	4.4	6.4	16.6	16.6	6.6	5.5	2.9	3.3	2.6	1.0	74.5	
1890	2.5	3.7	4.0	13.8	39.3	31.0	9.8	5.2	4.2	3.2	3.4	4.5	125.2	
1891	1.8	5.2	12.8	22.8	24.8	46.2	15.0	3.4	3.9	12.7	4.1	2.0	299.3	
1892	4.2	3.9	5.3	18.5	24.8	24.8	4.8	7.5	2.5	2.0	2.0	117.9		
1893	2.9	3.0	2.1	4.4	23.2	6.8	6.1	4.0	3.6	3.6	2.9	8.5	65.8	
1894	2.9	2.9	3.4	4.9	24.8	24.8	10.4	4.7	5.0	7.2	5.1	3.9	113.6	
1895	4.1	4.0	3.3	11.6	22.9	22.1	10.4	4.7	5.0	7.2	5.1	3.9	113.6	
1896	2.9	2.6	2.2	4.0	8.8	10.0	6.1	5.1	3.4	3.7	3.9	2.6	54.8	
1897	3.7	3.3	3.8	12.6	16.6	16.7	10.7	5.9	6.3	11.6	5.9	6.3	126.5	
1898	5.5	7.8	4.5	11.8	19.1	12.4	19.4	5.1	3.9	2.8	2.5	1.9	94.7	
1899	3.4	3.3	3.5	3.8	5.5	5.7	6.4	4.4	3.8	3.3	2.7	2.8	64.0	
1900	3.0	2.6	2.8	2.8	3.6	3.4	29.1	27.0	19.2	16.8	4.6	2.3	137.7	
1901	2.5	3.2	3.4	2.5	23.4	10.6	6.5	8.5	1.0	10.2	0.9	0.8	71.3	
1902	2.4	2.6	2.1	2.1	3.6	7.1	6.8	21.3	24.3	13.5	4.1	2.7	112.5	
1903	4.1	3.7	8.0	13.7	13.7	12.7	21.8	22.1	5.6	2.6	2.6	2.6	126.8	
1904	1.8	1.7	1.6	1.2	3.0	3.6	17.6	12.1	22.8	39.4	10.2	10.7	115.8	
1905	6.7	10.6	16.4	31.9	34.8	25.8	17.6	29.7	1.4	13.5	7.7	6.8	289.5	
1906	2.9	3.2	3.2	3.0	3.2	3.0	4.0	13.2	11.3	9.1	13.7	7.2	7.9	124.8
1907	13.7	10.6	6.8	25.7	47.5	47.9	28.4	16.1	3.0	7.1	0.4	1.3	196.7	
1908	2.5	2.3	4.6	13.8	0.3	0.8	28.9	13.0	5.7	6.6	1.3	6.6	78.8	
1909	5.6	5.2	6.7	14.6	22.2	13.0	1.7	12.9	14.8	2.6	6.2	5.3	115.9	
1910	11.2	2.9	10.4	17.1	15.8	5.5	12.7	3.6	3.4	1.1	1.3	1.3	91.9	
1911	3.0	3.1	14.4	3.6	20.3	2.8	65.3	29.6	6.0	45.8	1.8	12.2	204.3	
1912	0.5	2.3	9.2	16.8	71.6	18.0	11.0	5.5	2.3	1.1	7.7	2.9	111.6	
1913	2.5	2.7	1.6	11.9	9.3	7.4	5.5	23.4	15.5	17.1	7.4	4.3	117.4	
1914	6.8	7.6	9.7	9.0	22.0	27.4	12.8	9.6	3.8	7.7	7.0	5.8	143.6	
1915	5.0	5.1	4.0	4.7	11.3	15.6	11.9	10.6	8.3	4.6	5.1	5.0	85.6	
1916	5.6	4.0	4.7	9.8	8.3	11.9	6.1	7.2	5.8	6.6	3.1	6.6	73.9	
1917	6.5	7.0	6.2	5.7	7.1	9.1	18.5	10.4	9.9	9.6	7.0	7.5	104.3	
1918	5.2	5.0	5.5	5.1	6.7	6.9	6.6	6.3	4.7	6.3	2.9	3.3	64.6	
1919	3.3	3.9	2.0	1.7	9.0	8.7	9.8	10.0	13.9	14.4	5.2	9.0	91.1	
1920	3.7	3.1	10.4	5.1	7.5	6.3	9.8	10.0	8.9	9.0	9.1	5.6	51.1	97.8
1921	3.7	4.4	6.4	3.3	8.4	9.3	9.0	11.3	9.7	7.2	6.1	5.3	88.7	
1922	4.0	6.8	6.8	6.8	7.8	7.8	7.8	10.9	10.5	7.5	4.9	4.7	88.8	
1923	4.2	4.8	5.4	5.5	7.6	9.2	12.6	8.6	8.8	9.8	4.7	4.4	87.6	
1924	4.4	5.7	6.1	7.6	10.9	9.2	12.6	8.6	8.8	9.8	4.7	4.4	87.6	
1925	3.7	4.2	5.4	5.0	6.1	8.4	7.1	10.9	11.0	5.3	3.8	3.6	74.5	
1926	3.7	3.2	3.8	5.6	8.0	9.4	10.9	7.8	6.4	6.6	4.1	4.2	73.4	
1927	6.5	6.6	6.6	3.3	7.0	4.4	12.8	12.8	3.8	3.8	3.8	3.8	62.0	
1928	2.7	3.1	1.6	4.9	0.7	6.2	13.3	15.6	21.5	13.8	0.2	1.7	53.7	
1929	1.7	2.6	1.7	1.4	10.5	5.8	5.8	5.8	5.8	5.8	5.8	5.8	27.2	
1930	1.0	1.3	0.8	1.9	8.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	22.2	
1931	3.6	4.0	6.6	15.8	3.2	15.0	6.8	17.2	3.9	3.0	8.7	6.7	90.7	
1932	0.6	0.1	0.9	1.4	1.6	10.1	6.5	8.0	7.9	2.2	2.2	2.2	46.5	
1933	1.7	1.3	0.9	5.3	4.0	16.2	10.0	10.8	4.6	3.6	1.5	3.7	41.4	
1934	0.9	0.9	1.3	6.9	8.4	10.8	9.3	9.9	2.9	8.0	6.7	6.7	67.6	
1935	2.7	3.6	3.3	3.3	5.7	1.0	6.8	5.1	4.9	9.0	7.6	2.8	80.5	
1936	3.7	3.2	3.6	3.0	7.8	7.8	10.4	7.5	1.6	12.8	7.9	5.0	69.3	
1937	2.8	1.8	3.6	1.1	10.8	8.7	10.7	10.7	16.2	12.1	11.4	7.4	127.8	
1938	2.6	2.8	2.6	3.4	9.2	2.6	10.7	10.7	10.7	10.7	10.7	10.7	60.1	
1939	1.7	2.0	0.9	4.0	6.7	8.7	13.4	10.2	10.3	5.9	8.1	4.7	80.5	
1940	1.7	2.0	1.7	3.0	8.8	11.1	11.1	11.1	11.1	11.1	11.1	11.1	76.5	
1941	4.2	3.0	7.0	5.1	5.6	12.8	4.4	17.5	31.1	3.1	0.9	1.3	75.0	
1942	2.8	12.5	1.2	26.5	30.3	29.2	8.5	22.9	9.7	6.1	3.7	2.7	167.9	
Total	222.6	241.3	300.9	470.1	972.4	1,027.9	525.8	434.4	420.0	215.5	5,680.9			
Normal	1.1	1.5	1.6	1.7	18.0	19.2	10.2	10.3	8.0	7.8	4.0	4.3	105.2	

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
1889					-5.1	6.1	6.7	4.2					-5.7	
1890					-8.1	-23.7	-2.5	22.2	9.3				-2.8	
1891				-6.1	-11.2	-29.8	4.4	30.7	20.0	3.4	-7.7	2.9	3.4	1.3
1892					-10.0	-24.3	2.6	21.7	6.0				5.0	
1893						-16.2	5.6	8.4					0.8	
1894						-17.1	0.8	33.5	5.8				3.4	
1895					-7.3	-22.3	-19.2	26.0	15.5		-1.5	2.5	2.3	6.8
1896													0.9	
1897					-2.9	7.7	3.7	24.0	7.9	5.2			1.6	
1898													0.9	
1899													0.9	
1900													0.9	
1901													0.9	
1902													0.9	
1903													0.9	
1904													0.9	
1905													0.9	
1906													0.9	
1907													0.9	
1908													0.9	
1909													0.9	
1910													0.9	
1911													0.9	
1912													0.9	
1913													0.9	
1914													0.9	
1915													0.9	
1916													0.9	
1917													0.9	
1918													0.9	
1919													0.9	
1920													0.9	
1921													0.9	
1922													0.9	
1923													0.9	
1924													0.9	
1925													0.9	
1926													0.9	
1927													0.9	
1928													0.9	
1929													0.9	
1930													0.9	
1931													0.9	
1932													0.9	
1933													0.9	
1934													0.9	
1935													0.9	
1936													0.9	
1937													0.9	
1938													0.9	
1939													0.9	
1940													0.9	
1941													0.9	
1942													0.9	
Total	1.2			-21.8	-69.8	-142.9	272.4	226.0	30.8	-34.6	24.1		6.9	

STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

The data below cover all reservoirs in the Rio Grande Basin having over 15,000 acre-foot capacity. The monthly figures represent the acre feet of water in storage on the last day of each month.

The names of the reservoirs and the sources of the data are: Rio Grande, Continental, Santa Maria, Terrace, Mountain Home, Sanchez, Costilla and El Vado data are from the Secretary of the Rio Grande Compact Commission. Bluewater data are from the Secretary of the Bluewater-Toltec Irrigation District. Elephant Butte, Caballo, Almagordo, McMillan and Avalon data are from the United States Bureau of Reclamation. Red Bluff data are from the office of the Red Bluff Water Power Control District, Pecos, Texas. Willacy data are from the Willacy County Water Control and Improvement District No. 1. The data shown for Elephant Butte were modified to conform to capacity curves revised periodically for progressive silt deposition.

The data for Boquilla Reservoir for 1942 is from the Compañía Agrícola y de Fuerza Eléctrica del Rio Conchos, S.A. For the years 1913 to January 1917 the Boquilla data were carefully estimated from many dated photographs taken at the time by G. L. McKenzie, Gen'l Mgr., and A. C. Hobble, Elect. Engr., and from data by Edwin Duryea, Jr., and H. L. Heel, Cons'l. Engrs., published 1916, in Trans. A.S

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

In The United States					In Mexico														
Capacity 25.0					Capacity 2,116.0					Boquilla									
Month	1939	1940	1941	1942	Average	Month	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	**Normal	
Jan.	17.2	15.5	17.5	16.7		Jan.	0	0	356.2	737.1	1,166.4	1,966.9	2,044.7	2,114.2	1,998.9	1,982.2	1,704.5	3,778.5	
Feb.	11.4	8.8	20.0	15.4	13.9	Feb.	0	0	354.4	761.4	1,173.4	1,976.7	2,023.9	2,100.3	2,101.7	1,956.7	1,992.7	3,744.2	
Mar.	9.7	20.9	18.8	16.0	16.4	Mar.	0	0	352.6	770.8	1,173.4	1,976.1	1,996.1	2,072.5	2,073.9	1,923.4	1,910.1	1,624.5	3,720.2
Apr.	25.0	21.2	16.6	16.9	20.0	Apr.	0	1.0	347.2	768.5	1,164.4	1,907.5	1,963.3	2,044.7	2,040.6	1,884.9	1,862.3	1,572.3	1,699.8
May	20.2	14.6	16.9	16.6	17.0	May	0	3.0	347.2	885.9	1,151.1	1,874.2	1,926.1	2,008.6	2,011.4	1,890.3	1,825.7	1,590.9	1,670.4
June	14.4	20.2	25.8	20.4	20.2	June	0	18.5	342.6	776.3	1,132.0	1,876.0	1,916.8	1,976.6	1,811.9	1,777.6	1,468.8	1,491.2	
July	12.4	19.3	25.8	19.0	19.1	July	0	37.4	341.3	693.6	1,179.4	1,876.0	1,944.4	2,151.9	1,963.3	1,837.3	1,767.5	1,507.6	1,520.1
Aug.	10.1	16.0	26.9	16.3	17.3	Aug.	0	184.2	351.9	889.2	1,363.2	1,928.8	2,123.7	2,181.0	2,224.5	1,950.0	1,782.7	2,054.9	1,707.0
Sept.	13.9	15.2	24.7	15.8	17.4	Sept.	0	64.2	693.6	1,111.0	1,804.3	2,130.1	2,111.4	2,173.7	2,119.6	2,166.4	1,849.0	2,121.4	1,827.6
Oct.	22.9	18.9	19.3	19.5	20.2	Oct.	0	38.0	680.9	1,146.3	1,963.3	2,101.7	2,080.9	2,103.7	2,082.3	2,085.0	1,828.4	1,827.6	1,510.5
Nov.	11.1	15.8	22.9	15.8	16.4	Nov.	0	453.3	642.2	1,157.7	1,958.0	2,083.6	2,067.0	2,094.6	2,092.2	2,093.1	1,787.8	2,107.8	1,800.9
Dec.	25.6	15.2	21.2	15.0	19.2	Dec.	0	458.7	723.4	1,166.4	1,946.0	2,062.8	2,100.3	2,087.6	2,028.0	2,025.3	1,744.6	2,135.9	1,802.0

In The United States

McMillan and Avalon														Normal			
Month	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	Normal
Jan.	29.3	32.9	31.4	25.8	30.8	41.6	40.8	44.4	51.2	27.5	22.8	50.2	51.3	37.1	39.0	15.8	34.9
Feb.	29.5	26.0	33.5	34.8	45.0	42.2	49.0	34.2	30.3	26.7	21.8	51.3	38.4	39.6	23.7	24.4	37.9
Mar.	15.8	25.5	26.0	32.8	37.7	38.9	37.8	50.4	32.5	26.7	24.4	51.8	48.0	35.6	37.2	24.4	35.8
Apr.	22.8	16.4	18.7	25.0	27.2	32.4	28.4	36.4	37.0	6.0	10.7	43.5	26.0	16.8	26.6	15.0	24.4
May	.8	3.9	13.4	35.5	37.9	21.3	4.1	43.2	38.2	2.4	2.3	45.5	45.9	50.5	24.6	8.8	26.0
June	.6	6.4	6.2	32.2	47.5	42.7	40.5	39.8	25.0	.5	.5	50.2	48.2	50.1	32.0	7.8	26.2
July	11.0	18.2	2.7	37.1	31.6	31.6	32.8	32.9	32.9	.2	.2	41.6	31.0	47.8	16.2	.8	20.6
Aug.	2.1	15.3	21.3	5.8	24.3	18.8	36.8	34.7	25.1	3.5	9.2	32.0	31.3	47.7	.9	4.8	19.6
Sept.	5.5	13.5	13.9	1.7	23.3	19.4	26.3	6.0	23.6	9.5	1.8	32.4	19.0	41.8	1.5	11.2	15.8
Oct.	2.7	6.8	4.1	5.0	29.8	24.1	30.0	1.9	29.9	3.0	22.2	29.2	17.8	32.0	.6	46.8	17.2
Nov.	7.1	10.1	7.7	12.5	26.4	32.4	32.4	10.0	27.8	6.6	29.4	40.4	29.6	31.2	8.5	46.2	26.2
Dec.	20.6	22.0	19.6	23.6	33.8	36.6	43.4	20.9	31.9	14.4	40.8	51.0	29.4	33.7	15.4	46.0	30.2

Storage amounts through May 1914 are dead storages below elevation 1,291 meters. ** Period June 1914 - December 1923. After May 1914 the amounts are available storage above elevation 1,291 meters.

Month	Rio Grande (Capacity 51.1)		Continental (Capacity 25.7)		Santa Maria (Capacity 43.6)		Terrace (Capacity 17.7)		Mountain Home (Capacity 20.1)		Sanchez (Capacity 103.2)		Costilla (Capacity 20.7)		El Vajo (Capacity 200.3)		
	Storage		Storage		Storage		Storage		Storage		Storage		Storage		Storage		
	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Average	
1942	1927-1942	1942	1928-1942	1942	1928-1942	1942	1928-1942	1942	1928-1942	1942	1927-1942	1942	1927-1942	1942	1922-1942	1942	1935-1942
Jan.	46.9	15.5	10.0	2.6	24.7	7.3	6.5	2.7	11.5	5.0	33.1	11.8	9.1	4.1	113.5	55.5	
Feb.	47.9	16.8	10.0	2.6	25.2	7.9	7.1	3.1	11.8	5.4	33.1	11.8	9.5	4.4	114.6	55.0	
Mar.	49.1	18.0	10.0	2.6	25.7	9.7	7.6	3.6	12.0	5.7	32.9	12.6	10.0	4.9	71.2	59.3	
Apr.	49.1	17.7	10.0	3.1	26.9	11.8	9.1	4.2	14.4	6.3	37.9	14.9	10.0	6.3	150.8	123.3	
May	49.5	26.9	14.8	5.2	39.1	16.9	11.5	7.6	16.4	8.8	56.6	21.1	10.4	8.8	182.6	172.4	
June	49.2	29.2	22.0	6.2	42.1	19.0	11.6	9.6	15.3	8.9	62.4	20.0	10.6	7.9	186.7	162.2	
July	27.3	17.3	19.6	4.5	32.9	12.6	5.4	6.3	10.4	6.7	49.2	14.4	6.8	4.5	136.8	127.7	
Aug.	7.7	7.5	16.7	3.2	13.4	3.3	1.0	3.2	5.3	4.2	40.8	12.1	6.6	2.9	89.8	83.0	
Sept.	7.0	6.9	16.5	2.7	13.4	5.4	0	2.8	5.2	8.9	35.8	10.3	3.3	3.3	69.7	67.7	
Oct.	5.8	8.5	16.5	3.2	13.4	5.8	0	3.0	5.4	3.9	39.2	14.3	2.3	2.9	36.2	34.4	
Nov.	6.8	12.5	11.6	3.3	13.4	6.7	.8	2.2	5.4	4.6	38.2	13.9	2.7	3.3	39.4	54.6	
Dec.	7.2	13.9	11.6	3.6	13.3	7.2	1.3	2.5	5.4	4.8	38.2	13.6	3.0	3.7	42.4	57.6	
Average	29.5	15.9	14.9	3.7	23.6	9.6	5.2	4.2	9.9	5.7	41.8	14.5	6.6	4.7	101.3	90.0	
Maximum	49.5	51.5	22.0	22.0	42.1	42.1	11.6	17.7	16.4	16.4	62.4	62.4	10.6	15.1	186.7	1197.7	
Minimum	5.8	0	10.0	0	13.3	0	0	0	5.2	0	32.9	1.6	2.3	0	36.2	2.3	

Month	Bluewater (Capacity 50.3)		Elephant Butte (Capacity 2,219.0)		Cabo (Capacity 346.0)		Alamogordo (Capacity 157.0)		McMillan and Avalon (Capacity 44.8)		* Red Bluff (Capacity 310.0)		Total in United States Reservoirs (Capacity 3,630.5)		
	Storage		Storage		Storage		Storage		Storage		Storage		Storage		
	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	#Normal	Estimated	
1942	1927-1942	1942	1915-1942	1942	1924-1942	1942	1927-1942	1942	1927-1942	1942	1927-1942	1942	1922-1942	1942	Estimated
Jan.	30.5	6.4	1,906.9	1,021.6	343.1	136.0	145.7	83.5	39.6	33.1	313.5	141.9	3,048.1	1,563.7	
Feb.	29.8	7.3	1,875.0	1,026.7	345.9	127.6	146.3	86.1	37.7	32.5	310.0	146.0	3,073.5	1,546.8	
Mar.	35.2	12.9	1,886.0	1,017.9	347.7	97.7	145.8	81.7	36.0	31.7	308.0	145.8	3,296.2	1,508.9	
Apr.	42.2	16.8	2,116.7	1,033.1	364.0	81.4	128.7	70.9	36.0	21.3	308.0	125.7	3,280.7	1,556.8	
May	38.6	14.7	2,235.1	1,187.7	314.8	85.2	138.5	91.7	36.2	29.4	309.9	169.2	3,470.6	1,622.6	
June	34.4	11.7	2,252.9	1,244.8	316.7	79.0	143.0	79.7	28.7	24.2	299.0	205.2	3,495.0	1,288.0	
July	29.4	10.0	1,65.5	1,180.1	289.0	71.9	143.0	62.2	18.8	21.0	272.5	186.7	3,115.4	1,775.3	
Aug.	25.8	8.7	1,968.6	1,101.1	237.7	62.4	145.5	93.1	15.4	19.1	258.8	172.3	2,939.4	1,600.8	
Sept.	24.0	8.5	1,930.9	1,058.5	137.2	49.7	138.7	95.5	34.4	26.5	302.6	135.9	2,720.1	1,516.4	
Oct.	21.7	8.0	1,878.3	1,056.2	171.6	75.5	141.4	99.6	39.3	31.1	294.6	156.1	2,684.2	1,546.7	
Nov.	20.5	7.8	1,814.2	1,060.9	215.2	113.0	92.0	81.2	36.9	31.1	300.0	158.1	2,617.8	1,569.6	
Dec.	19.8	7.4	1,780.5	1,065.6	224.7	148.8	93.7	82.9	39.6	32.2	301.4	161.6	2,642.0	1,624.6	
Average	29.5	10.0	1,975.0	1,087.8	268.0	95.6	133.1	85.7	32.5	27.7	297.7	160.4	2,985.4	1,633.4	
Maximum	42.2	47.1	2,302.8	2,302.8	346.6	146.6	157.7	156.3	39.6	32.5	327.5	327.5	3,495.0	1,633.4	
Minimum	19.8	0	1,780.5	3.3	113.9	1.9	92.0	14.2	15.4	0	252.8	11.0	2,642.0	0	

In Mexico

Month	Boquilla (Capacity 2,116.0)		Centenario and San Miguel (Capacity 19.9)		Don Martin (Capacity 1,123.0)		Culebron and Villa Cardenas (Capacity 66.5)		Palto Blanco No. 2 (Capacity 178.8)		Total in Mexican Reservoirs (Capacity 3,503.8)	
	Storage		Storage		Storage		Storage		Storage		Storage	
	#Normal	#Normal	Average	Average	Normal	Normal	Average	Average	Normal	Normal	Normal	Estimated</

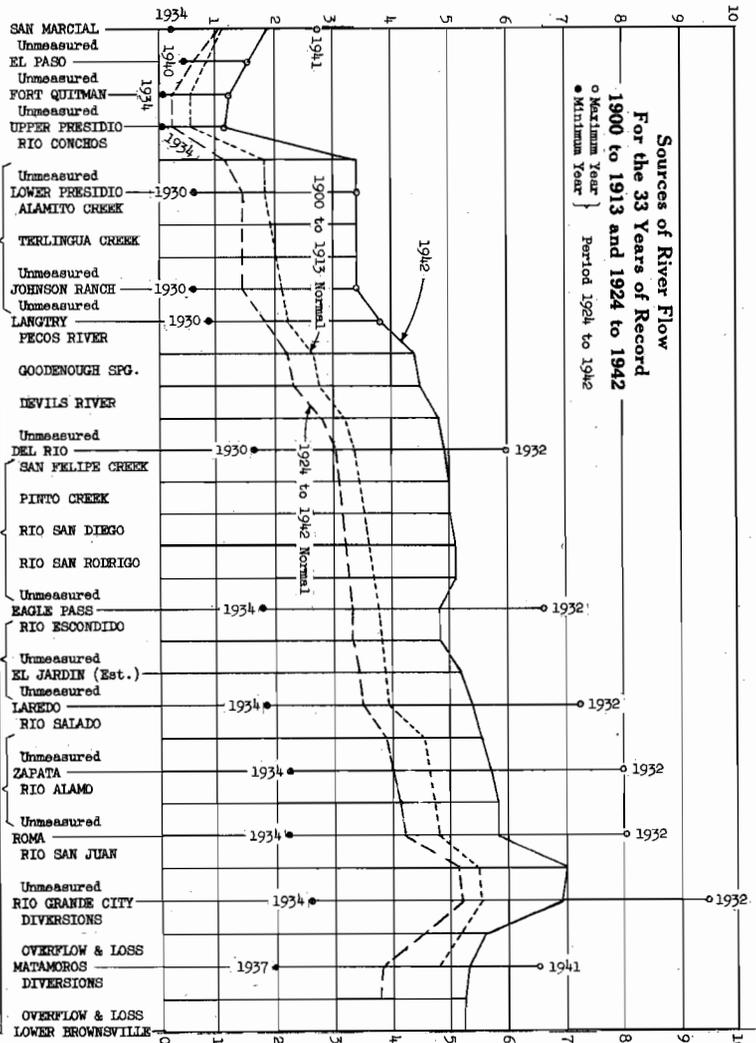
SOURCES OF RIVER FLOW

A distinction must be made clear between the figures in the table at the lower or left side of this page showing average annual unused run-off and the graphical part of the page showing average annual unused stream flow. As an illustration of this distinction, consider these two different values at Lower Presidio. Both values are expressed as average annual acre feet per square mile of watershed tributary to the station. The amount shown graphically above or to the right of the page is the water which actually flowed past this station. On the other hand the amount shown by figures below or to the left of the page is the water which actually flowed past the station and from which a certain amount of water is subtracted and to which certain other amounts of water are added. In the case of Lower Presidio these subtractive and additive amounts of water are (a) Subtractive - the water which ran off the watershed into Boquilla reservoir in years prior to 1924, and was drawn from the reservoir during the period 1924 to 1942. (b) Additive - the water impounded since 1924 and remaining in Caballo and Elephant Butte reservoirs at the close of 1942. (c) Additive - the water impounded since 1924 in El Vado and several small reservoirs on the upper Rio Grande in New Mexico and Colorado and which remained therein at the end of 1942. This additive carry-over storage in El Vado and the small reservoirs on the Rio Grande above San Marcial averaged 7,310 acre feet per year. In Caballo and Elephant Butte reservoirs the carry-over storage averaged 34,680 acre feet per year additive. The carry-over storage in Boquilla reservoir averaged 5,740 acre feet per year subtractive. Other carry-over storage figures are: Alamogordo, Avalon, McMillen and Red Bluff on the Pecos River 20,450 acre feet per year additive. Centenario and San Miguel on the Rio San Rodrigo 630 acre feet per year additive. Don Martin on the Rio Salado 9,160 acre feet per year additive.

Average Annual Unused Run-off A. F. Per Sq. Mi.

1900-1913	1924-1942
46.8*	43.0*
29.7*	22.3*
17.1*	9.8*
16.6*	8.8*
51.0	47.7
23.6	19.2
28.6*	24.2*
12.3	11.5
115,000†	108,000
106	113.4
55.3	75.6
28.1*	25.6*
109	76.3
30.5*	27.2*
29.7	33.8
30.5*	27.4*
27.2	19.7
60.9	56.2
31.0*	27.3*
52.9	82.1
34.8 †	32.0
32.6*	31.2*

Unused Stream Flow in Millions of Acre Feet Per Year



* Unused run-off at and above gaging station. Unused Stream Flow in Millions of Acre Feet Per Year † Estimated.

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

This concrete-lined canal diverts water from the Rio Grande at the American Dam near El Paso, Texas, 2.1 river miles above the International Dam near Ciudad Juarez, Chihuahua. The gaging station is an open channel rating station with water-stage recorder located 396 feet below the canal head-gates. The zero of the gage is 3,712.09 feet above U.S.C. & G.S. sea level datum. 1942 record good.

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 some is frequently returned to the Rio Grande at spillways 2.2, 2.7 and 3.6 river miles below the American Dam. At times 2 small diversions are made from this canal. See the lower part of this page for details.

RECORDS: Based upon 56 current meter measurements during the year and a stable rating curve. Records available June 2, 1938 (when the operation of this canal began) to December 31, 1942.

EXTREME FLOWS: The greatest mean daily flow in the canal occurred July 31, 1940, with a flow of 1,730 second feet. The lowest flow in the canal was .2 second foot on many occasions.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.				
1	212	" 2.0	564	1,040	1,020	849	773	668	803	774	251	401				
2	213	" 2.0	544	1,160	1,030	824	677	663	790	769	352	334				
3	215	" 2.0	* 679	1,140	1,020	811	662	653	804	759	353	391				
4	211	312	675	956	971	810	728	648	824	770	427	347				
5	214	396	661	1,120	967	846	762	676	844	760	432	319				
6	* 223	313	627	1,160	954	900	712	692	787	787	514	331				
7	218	300	686	1,230	947	975	690	652	803	782	477	300				
8	215	306	743	1,210	946	960	707	695	855	792	399	296				
9	215	δ 407	736	1,100	939	929	724	697	831	800	429	266				
10	215	δ 554	735	924	947	930	733	716	831	817	406	248				
11	80.9	486	705	823	956	937	787	731	806	817	333	232				
12	" 3.0	455	729	1,080	946	942	774	691	799	814	305	277				
13	" 3.0	417	712	1,370	948	950	745	680	758	770	293	571				
14	97.6	409	641	1,260	933	980	686	703	809	793	277	577				
15	211	370	673	1,360	921	978	586	644	766	806	275	569				
16	211	376	711	1,280	940	947	560	703	809	798	254	577				
17	223	421	637	1,050	952	927	572	737	782	850	253	643				
18	213	382	506	1,030	964	931	550	753	760	807	246	667				
19	70.9	370	449	1,060	960	922	715	730	757	691	238	801				
20	" 3.0	384	583	1,020	961	927	697	714	818	564	216	612				
21	3.0	379	657	893	969	929	722	730	789	508	193	545				
22	3.0	334	600	955	924	909	736	744	769	477	206	541				
23	2.5	330	638	1,040	823	857	715	744	800	434	412	450				
24	2.5	299	595	1,090	776	874	690	726	805	410	372	427				
25	2.5	334	761	1,060	796	903	688	775	825	401	386	369				
26	2.5	343	1,090	972	810	895	653	761	829	367	437	341				
27	2.5	477	1,050	1,070	871	883	665	759	773	347	415	310				
28	2.5	646	961	1,170	854	910	683	785	776	327	458	301				
29	2.5		937	988	854	896	675	779	761	303	450	281				
30	2.5		1,230	950	835	833	705	770	769	286	452	270				
31	2.0		1,160		845		684	779		285		261				
Sum		9,806		32,581		28,579		27,164		22,198		19,665		10,511		12,851
	3,295.4		22,695					21,454		22,932		19,665		10,511		12,851

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acres Feet		
	High	Low	High		Low	Average			Maximum	Minimum	
			Day	Day							
Jan.	5.70	-	14	238	31	" 2.0	106	6,540	1,696	6,540	61.5
Feb.	9.51	-	28	1,140	1	" 2.0	350	19,500	11,740	19,500	5,170
Mar.	10.14	6.20	30	1,390	20	389	732	45,000	34,262	45,000	24,450
Apr.	10.60	-	15	1,630	12	" 300	1,090	64,600	53,725	64,600	45,800
May	9.06	8.06	3	1,050	24	756	922	56,700	47,075	56,700	39,700
June	9.40	8.37	15	1,000	2	805	905	53,900	53,140	54,300	51,200
July	9.32	7.33	12	953	17	518	690	42,600	56,100	60,700	42,600
Aug.	8.85	7.80	9	835	15	577	716	44,000	55,580	61,000	44,000
Sept.	9.15	7.68	20	933	13	578	798	47,500	43,320	47,500	38,200
Oct.	8.75	5.95	18	922	30	251	634	39,000	24,520	39,000	13,100
Nov.	7.50	5.80	6	565	22	177	350	20,800	11,918	20,800	5,630
Dec.	8.59	5.87	19	852	11	219	415	25,500	13,614	25,500	8,440
Yearly	10.60	-		1,630		" 2.0	643	465,640	406,690	465,640	356,622

* Estimated † And Other Days ‡ Deduced

§ The average, maximum and minimum discharges for January through May are for period 1939 - 1942.

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 1942, 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 diversion averaged 1 second foot and the Globe Mill averaged .5 second foot. Thus a total of 1,086 acre feet were diverted in 1942.

DIVERSIONS FROM THE RIO GRANDE INTO THE ACEQUIA MADRE (MEXICAN CANAL) Near Juárez, Chihuahua, Together With Corresponding ACREAGE CULTIVATED, WATER DUTY AND RAINFALL

This canal diverts water from the Rio Grande at the International Dam at Juarez, Chihuahua, 2.1 river miles below the American Dam at El Paso, Texas. The gaging station is an open channel rating station with water-stage recorder located 1 mile below the head of the canal and a few hundred feet above the first spillway on the canal.

The record is based upon 91 current meter measurements at this station during the year, 85 by the Mexican Section and 6 by the United States Section of this Commission. Computations by shifting channel methods. 1942 records good. This record began with 1938, the year the American Dam began operating.

In 1942, 56,174 acre feet were distributed to 16,789 acres of land irrigated in the first unit under the canal where a diversion duty of 3.35 acre feet per acre was obtained. 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.

The average annual evaporation from standard United States Weather Bureau pan in this region is approximately 95 inches per year. See evaporation records elsewhere in this Water Bulletin.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	109	77.3	229	180	264	255	103	0	0	0
2	0	0	114	100	224	208	225	289	115	0	0	0
3	0	0	3.5	89.7	237	219	253	295	145	0	0	0
4	0	0	13.1	93.9	272	256	266	274	156	0	0	0
5	0	0	22.2	96.1	291	273	230	271	178	0	0	0
6	0	0	27.5	95.7	279	261	228	279	181	0	0	0
7	0	0	49.1	98.5	258	242	260	233	201	0	0	0
8	0	0	55.1	87.2	306	226	280	255	216	0	0	0
9	0	0	50.1	89.3	313	227	274	245	233	0	0	0
10	0	0	48.0	96.1	339	232	268	220	244	0	0	0
11	0	0	42.7	96.4	307	285	250	230	227	0	0	0
12	0	0	45.2	108	299	275	256	263	188	0	0	0
13	0	0	45.2	108	265	256	260	262	242	0	0	0
14	0	0	41.3	114	260	263	265	205	180	0	0	0
15	0	0	49.1	145	273	242	234	220	226	0	0	0
16	0	0	12.0	145	283	261	247	236	254	0	0	0
17	0	0	0	173	271	288	210	210	243	0	0	0
18	0	0	0	195	259	296	214	211	224	0	0	0
19	0	0	23.7	185	245	294	313	231	178	0	0	0
20	0	0	54.0	188	282	300	273	231	186	0	0	0
21	0	0	58.6	216	275	285	220	243	257	0	0	0
22	0	0	55.8	228	252	280	184	228	215	0	0	0
23	0	0	70.3	211	240	260	18.4	182	212	0	0	0
24	0	0	42.7	219	196	281	124	61.8	229	0	0	0
25	0	0	33.9	245	224	293	326	46.6	239	0	0	0
26	0	0	33.2	224	256	296	311	180	237	0	0	0
27	0	0	32.5	260	241	291	288	120	226	0	0	0
28	0	0	34.3	262	240	278	280	61.1	238	0	0	0
29	0	0	36.4	287	244	282	279	65.3	237	0	0	0
30	0	0	36.4	295	231	284	278	69.2	231	0	0	0
31	0	0	76.6	229	229	269	269	67.5	231	0	0	0
Sum	0	0	1,315.5	4,828.2	8,120	7,914	7,647.4	6,239.5	6,241	0	0	0

Month	Rainfall		Extreme Second Feet — 1942				Average Second Feet 1942	Acre Feet			
	Average 1942	Normal 1924 to 1942	High		Low	Total 1942		Period 1938-1942			
			Day	Day				Average	Maximum	Minimum	
Jan.	.44	.38				0	0	0	0	0	
Feb.	.37	.29				0	0	0	0	0	
Mar.	T	.32	1	242	#	0	42.4	2,610	φ 3,276	5,540	1,120
Apr.	.99	.34	30	350	1	39.2	161	9,580	φ 8,500	11,720	6,040
May	.02	.44	10	349	25	145	262	16,110	φ 13,976	17,380	11,200
June	.28	.43	21	339	2	147	264	15,700	11,950	15,700	9,760
July	1.02	1.46	29	470	24	4.2	247	15,170	10,386	15,170	7,910
Aug.	3.29	1.75	2	406	24	9.9	201	12,380	8,688	12,380	5,200
Sept.	.86	1.30	15	322	1	68.2	208	12,380	6,784	12,380	2,240
Oct.	1.27	.87					0	0	124	328	0
Nov.	T	.38					0	0	0	0	0
Dec.	1.25	.45					0	0	0	0	0
Yearly	9.79	8.41		470		0	116	83,930	63,684	83,930	55,320
Acreage Irrigated on the First Unit only								16,788	*16,182	*17,090	*13,967
Mean Acre Feet Per Acre on the First Unit only								3.35	* 3.20	* 3.90	* 2.80
Average Rainfall in Inches								9.79	φ 8.41	φ 15.99	φ 3.88

Various Days φ These averages include the following amounts for 1938, Mar. 5,310, Apr. 8,720, May, 17,380.
 @ Period 1924-1942. * Period 1939-1942.

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

Together With Corresponding ACREAGE CULTIVATED, WATER DUTY AND RAINFALL

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 station.

The diversions were measured for 68,135 acres, or 98.7% of the total area. This area lies above the lower end of the Hudspeth County Conservation and Reclamation District Number One. These water measurement and acreage records were furnished by the El Paso office of United States Bureau of Reclamation. For 870 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 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. 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. This record began July 1, 1938.

The average annual evaporation from standard Weather Bureau pan in this region is approximately 95 inches per year. See evaporation records elsewhere in this Water Bulletin.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	34	452	1,095	796	992	950	921	634	727	129	320
2	0	36	648	1,204	841	1,028	815	1,205	600	608	267	283
3	0	37	669	994	841	1,015	1,081	1,250	689	256	229	415
4	0	0	313	969	769	1,038	860	989	591	408	246	366
5	0	0	442	963	745	972	663	776	444	453	213	197
6	0	0	443	849	819	764	884	968	473	541	211	314
7	0	0	430	924	855	565	1,069	1,080	753	386	389	345
8	0	190	375	783	770	872	1,146	1,046	741	284	260	298
9	0	384	392	708	901	865	1,066	880	772	322	293	290
10	0	152	449	985	798	789	1,149	994	897	337	206	231
11	0	196	414	880	820	965	1,004	985	1,069	311	168	244
12	0	365	426	917	829	968	483	960	873	304	151	199
13	0	392	498	1,066	867	480	1,034	1,079	1,025	92	176	258
14	0	381	512	1,101	912	876	1,079	977	822	236	187	342
15	0	339	461	1,004	832	1,002	890	381	1,034	373	165	300
16	0	240	452	1,070	782	949	1,067	185	980	196	102	319
17	0	492	533	1,014	687	990	1,089	741	986	353	235	394
18	0	363	595	1,083	757	1,067	1,084	866	919	379	244	417
19	0	309	666	997	864	1,066	548	863	672	332	221	411
20	26	425	619	984	888	1,092	999	753	609	235	210	81
21	32	469	701	1,043	864	645	918	791	804	277	212	198
22	36	322	728	922	838	1,220	1,013	855	667	267	157	256
23	37	523	800	702	731	1,082	1,037	35	742	200	335	150
24	36	293	660	421	721	1,226	709	706	665	229	407	0
25	36	311	751	410	810	1,336	555	668	646	130	362	0
26	34	378	798	701	994	1,134	595	596	635	259	389	0
27	34	467	827	861	1,194	813	980	574	514	277	434	0
28	34	471	1,030	1,005	1,013	594	1,060	725	705	266	398	0
29	36	758	770	1,018	1,144	1,037	452	730	210	400	0	0
30	32	942	858	911	1,165	1,157	473	760	180	379	0	0
31	32	959		837		1,042	435		183			0
Sum		7,569	18,743	27,263	26,304	28,714	29,063	24,209	22,451	9,611	7,765	6,628

Month	Rainfall		Extreme Second Feet — 1942 †				Average Second Feet 1942	Acre Feet			
	Average 1942	Normal 1924 to 1942	High		Low			Total 1942	Period 1938-1942		
			Day		Day				Average	Maximum	Minimum
Jan.	.44	.38	23	37.0	‡1	0	13.1	803	399	803	0
Feb.	.37	.29	23	523	‡4	0	270	15,010	10,258	15,010	3,720
Mar.	†	.32	28	1,030	4	313	605	37,180	31,745	37,180	21,600
Apr.	.99	.34	2	1,204	25	410	909	54,080	51,970	54,080	49,400
May	.02	.44	27	1,194	17	687	849	52,170	45,442	52,170	41,700
June	.28	.43	25	1,356	13	480	957	56,950	52,038	56,950	49,100
July	1.02	1.46	30	1,157	12	483	938	57,650	55,630	61,500	44,200
Aug.	3.29	1.75	3	1,250	23	35	781	48,020	52,924	57,100	48,020
Sept.	.86	1.30	11	1,069	5	444	748	44,530	36,506	44,530	22,500
Oct.	1.27	.87	1	727	13	92	310	19,060	20,012	25,700	13,900
Nov.	†	.38	27	434	16	102	259	15,400	13,752	17,000	9,960
Dec.	1.25	.45	18	417	‡24	0	214	13,150	11,224	13,150	9,370
Yearly	9.79	8.41		1,336		0	572	414,003	381,900	414,003	355,883
Irrigated Acreage								69,005	66,256	69,005	61,751
Mean Acre Feet Per Acre								6.00	# 5.74	# 6.05	# 5.21
Average Rainfall in Inches								9.79	‡ 8.41	‡ 15.99	‡ 3.88

† And Other Days. ‡ Period 1924 - 1942. § Mean Daily Extreme. # Period 1939 - 1942.

DIVERSIONS FROM THE RIO GRANDE INTO THE MAVERICK CANAL EXTENSION BELOW THE POWER PLANT Near Eagle Pass, Texas, Together With Corresponding ACREAGE CULTIVATED AND RAINFALL

The Maverick Canal diverts water for power and irrigation from the Rio Grande into Texas at a point 17.4 river miles below the international bridge between Del Rio, Texas and Villa Acuña, Coahuila, and 711.0 river miles below the American Dam at El Paso, Texas. The tail water from the power plant returns to the river about 32.2 miles farther downstream.

The Maverick Canal Extension begins at the power 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 headgate. Meter measurements are from bridge. Irrigation first began from this canal extension in June 1938. Records of canal discharge began April 1, 1939, and extend to December 31, 1942.

From this canal extension in 1942 there were 9,630 acres of land irrigated, northward and southward from Eagle Pass, as indicated in the table below. Under the Maverick Canal above the power plant the Maverick County Water Control and Improvement District reported that in 1942 the cultivated area was 4,844 acres, all of which were irrigated.

Waste water from this canal extension reaches the river below the Eagle Pass gaging station.

The average annual evaporation from natural water surfaces in this region is approximately 65 inches per year. See Water Bulletin No. 5, page 58 and evaporation records elsewhere in this bulletin.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	168	146	128	154	136	144	160	134	95.0	146	165	161
2	164	144	127	154	137	147	160	139	113	153	164	162
3	164	144	129	154	137	150	157	137	99.8	154	167	161
4	169	144	128	156	137	151	157	137	99.9	163	168	161
5	166	145	130	156	137	152	134	138	100	157	167	162
6	167	144	129	145	136	153	121	138	101	153	168	169
7	167	145	130	128	142	156	166	140	97.9	153	128	168
8	168	148	140	98.2	146	154	148	141	71.4	153	171	162
9	168	139	140	140	146	154	137	143	71.7	157	165	162
10	169	147	148	140	142	155	135	143	71.7	155	163	164
11	172	147	152	140	138	156	132	144	71.5	163	163	162
12	168	147	154	142	137	155	130	145	71.6	156	161	167
13	171	148	156	139	140	155	126	146	72.6	158	159	177
14	170	148	158	138	138	158	123	147	74.6	157	158	172
15	172	149	160	138	139	158	124	148	104	155	165	172
16	172	149	158	138	138	157	123	151	135	153	161	173
17	174	148	160	138	102	161	125	148	137	158	159	169
18	178	148	160	138	145	168	126	151	138	161	159	169
19	176	148	160	140	98.2	170	127	150	138	155	159	171
20	175	146	160	138	98.0	171	125	149	139	157	158	175
21	176	133	160	138	138	175	125	151	138	158	157	171
22	166	132	160	138	138	173	125	151	138	159	163	169
23	147	131	160	139	139	174	125	152	140	161	158	170
24	148	131	160	138	141	174	125	151	139	162	160	168
25	149	129	158	138	141	174	125	153	139	162	160	175
26	148	129	158	138	142	167	126	155	139	162	163	171
27	146	129	157	137	142	160	125	156	142	163	160	173
28	147	128	158	137	144	161	125	156	141	164	160	169
29	146	159	157	144	159	129	129	155	140	164	165	169
30	145	156	137	144	144	160	133	134	145	166	162	169
31	146	156	156	145	145	133	133	92.1	166	166	169	169
Sum	5,062	3,966	4,649	4,193.2	4,227.2	4,802	4,132	4,475.1	3,403.7	4,904	4,836	5,212

Month	Rainfall		Extreme Second Feet — 1942				Average Second Feet 1942	Acre Feet			
	Average 1942	Normal 1924 to 1942	High		Low			Total 1942	Period 1939-1942		
			Day		Day				Average	Maximum	Minimum
Jan.	.56	.85	21	181	12	125	165	10,000	5,300	10,000	" 2,140
Feb.	1.13	.75	15	150	26	117	142	7,870	4,098	7,870	" 2,120
Mar.	.35	.90	19	162	2	116	150	9,220	4,920	9,220	" 1,150
Apr.	2.39	1.63	6	160	8	65.2	140	8,320	5,185	8,320	3,430
May	3.55	3.23	18	162	17	54.8	136	8,380	4,215	8,380	2,840
June	.58	2.36	24	178	5	138	160	9,520	5,585	9,520	3,750
July	1.49	1.94	4	182	6	74.3	133	8,200	6,000	8,200	4,510
Aug.	3.31	1.66	27	157	30	76.1	144	8,880	5,705	8,880	3,480
Sept.	4.15	2.90	30	157	14	70.8	113	6,750	5,418	6,750	4,600
Oct.	.47	1.56	31	168	3	102	158	9,730	7,182	9,730	5,130
Nov.	.47	.72	4	177	7	58.8	161	9,590	7,390	10,470	4,170
Dec.	.44	1.22	13	179	4	138	168	10,300	7,802	10,400	4,280
Yearly	18.89	19.72		182		54.8	147	106,760	69,000	106,760	44,950
Irrigated Acreage								9,630			
Mean Acre Feet Per Acre											
Average Rainfall in inches	18.89	φ 19.72							φ 29.27		φ 11.80

φ Period 1924 - 1942 † And Other Days " Estimated

DIVERSIONS FROM THE RIO GRANDE
ON THE UNITED STATES SIDE BELOW RIO GRANDE CITY STATION
Together With Corresponding
ACREAGE CULTIVATED, WATER DUTY AND RAINFALL

Diversion from the Rio Grande for irrigation are made here almost entirely by pumping. 92.5% of the water diverted was measured at the diversion point. The remainder was estimated. A very small part of the measurements were made by plant efficiency and power input; otherwise measurements were by Venturi Meters, open channel rating stations, and Deflection Meters developed by this Commission. There is some re-use within the area of drainage water from the area. Drainage water from this area does not return to the Rio Grande. During the year 84,844 acre feet of water were diverted and used on the new Willacy County Irrigation District, where 90,000 acres were cultivated, of which 35,000 acres were irrigated. The cultivated area and water diverted to Willacy County are all included in the tables below. During the year 1,500 acres were cultivated in Starr County below Rio Grande City gaging station, of which 1,285 acres were irrigated from the Rio Grande.

The cultivated areas shown here are all supplied with irrigation facilities. More than one crop per year is often grown on some of the land. The area actually irrigated this year was 75.7% of the cultivated area. The average annual evaporation from natural water surfaces in this vicinity is approximately 55 inches per year. See Water Bulletin No. 5, page 58.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	339	357	439	2,296	2,454	2,856	284	937	2,156	2,145	814	2,339
2	652	1,250	1,354	2,284	1,773	2,861	213	520	2,119	2,017	1,939	2,429
3	159	1,458	1,702	2,387	1,265	2,728	204	1,155	2,308	1,619	1,872	2,444
4	223	1,353	1,598	1,886	2,591	2,698	61	1,271	1,873	1,061	1,482	2,449
5	546	1,244	1,396	1,097	2,393	2,884	123	1,006	1,244	1,404	1,603	1,743
6	347	1,191	1,414	2,254	2,334	2,275	214	424	798	1,254	1,653	950
7	384	814	1,230	2,459	1,951	1,814	316	832	2,021	1,263	1,310	1,886
8	274	752	1,006	2,562	534	2,721	402	684	2,439	1,593	706	2,180
9	316	1,246	1,772	2,554	275	2,887	659	339	2,037	1,572	1,822	2,012
10	26	1,012	1,955	2,355	190	3,160	548	1,370	1,805	1,199	1,986	1,733
11	81	487	2,316	1,922	536	3,273	334	1,816	1,810	943	1,622	2,090
12	361	674	2,514	1,282	657	3,531	257	1,830	1,123	1,718	1,571	1,709
13	424	942	2,100	2,831	807	3,399	259	1,701	632	1,637	1,763	1,086
14	339	313	2,404	2,924	885	3,068	579	1,667	907	1,681	1,269	2,266
15	187	252	1,368	2,714	790	3,642	430	895	852	1,651	707	2,397
16	320	1,051	2,462	2,619	496	3,610	614	377	1,216	1,755	1,908	2,298
17	112	1,172	2,677	2,473	414	3,530	637	1,477	1,103	1,649	2,021	2,246
18	111	911	2,716	1,770	924	3,616	491	1,588	1,122	1,335	2,242	2,158
19	559	365	2,780	925	1,242	3,620	607	1,453	1,052	1,651	2,406	1,512
20	362	294	2,741	2,051	1,286	3,278	1,139	1,330	1,035	1,723	2,144	791
21	712	273	2,326	1,761	1,161	1,996	961	1,180	1,456	1,601	1,384	1,664
22	758	222	1,973	1,580	1,157	719	894	861	1,692	1,635	900	2,045
23	729	606	2,725	1,486	1,114	108	1,031	511	1,844	1,761	2,233	1,927
24	448	1,061	2,957	1,778	836	6	906	1,571	2,132	1,292	2,330	988
25	465	1,277	2,809	1,358	2,196	22	499	1,842	2,068	995	1,964	415
26	1,130	1,330	2,763	841	2,307	147	299	1,597	1,729	1,210	1,235	745
27	1,089	1,456	2,627	2,198	2,428	159	1,161	1,713	1,033	1,081	2,174	863
28	1,341	797	2,194	2,329	2,417	159	969	1,830	1,870	1,381	1,756	1,912
29	1,225		1,870	2,308	2,416	183	955	1,129	2,102	1,525	1,080	2,080
30	1,131		2,760	2,488	2,017	211	837	834	2,102	1,444	2,148	2,141
31	519		2,553		1,207		827	2,227		1,217		2,350
Sum		24,140		61,772		65,161		37,967		46,012		55,642
	15,669		65,200		43,053		17,710		47,680		50,044	

Month	Rainfall		Extreme Second Feet — 1942				Average Second Feet 1942	Acre Feet			
	Average 1942	Normal 1922 to 1942	High		Low	Total 1942		Period 1922-1942			
			Day	Day				Normal	Maximum	Minimum	
Jan.	.89	1.51	28	1,341	10	26	505	31,100	37,305	71,100	7,700
Feb.	.98	1.04	3	1,458	22	222	862	47,900	59,934	134,160	6,960
Mar.	.31	1.34	24	2,957	1	439	2,103	129,000	80,420	156,180	14,100
Apr.	.07	1.31	14	2,924	26	841	2,059	123,000	67,834	125,000	29,300
May	2.13	3.38	4	2,591	10	190	1,389	85,400	57,720	135,180	4,510
June	6.69	3.07	15	3,642	24	6	2,172	129,000	57,062	129,000	1,500
July	2.03	2.15	27	1,161	4	61	571	35,100	50,541	103,120	10,010
Aug.	1.59	1.71	31	2,227	9	339	1,225	75,300	68,540	113,000	19,330
Sept.	2.41	4.85	8	2,439	13	632	1,589	94,600	48,819	110,130	8,020
Oct.	1.45	2.10	1	2,145	11	943	1,484	91,300	57,028	102,000	21,430
Nov.	.58	1.33	19	2,406	8	706	1,668	99,300	49,787	99,300	11,410
Dec.	.31	2.01	4	2,449	25	435	1,795	110,000	37,581	110,000	10,410
Yearly	19.44	25.80		3,642		6	1,452	1,051,000	672,571	1,051,000	472,500
Average Acreage Cultivated below Rio Grande City								489,325	349,286	504,910	216,300
Mean Acre Feet Per Acre								2.15	1.93	2.68	1.03
Average Rainfall in Inches								19.44	25.80	36.84	16.68

DIVERSIONS FROM THE RIO GRANDE INTO THE RETAMAL CANAL

Near Rio Bravo, Tamaulipas

The Retamal Canal was constructed by the Flood Control Works Commission of the Lower Rio Grande Valley of Mexico. During floods this canal is used as a floodway. It empties into Culebrón Lake which serves as a reservoir and which in turn discharges into Villa Cardenas reservoir or lake. From this latter lake a canal leads to Palito Blanco No. 2 reservoir. These lakes or reservoirs are also used for irrigation purposes. In 1942 there were 14,282 acres of land thus irrigated through the Retamal Canal. During floods flood water may escape from Villa Cardenas lake via floodway No. 1 into the Gulf of Mexico.

Retamal Canal has a capacity of about 7,000 second feet. Its intake is 24.0 river miles below the Hidalgo-Reynosa bridge near Hidalgo, Texas and 1,108.8 river miles below the American Dam at El Paso, Texas. About 1,000 feet below its intake there is a canal control gate 1.2 miles below which are several gages where gage readings are taken as often as required by the variations of flow. These gages were installed Sept. 1, 1939. In July 1940 a water-stage recorder was installed at this point. Measurements are made by current meter during low flows and by floats during floods. The flow records of this canal began September 1, 1939. The 1942 record is only fair. The data for the present year are based upon 135 measurements by current meter, 8 by the Mexican Section and 127 by the National Irrigation Commission.

Mean Daily Discharge in Second Feet 1942 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	516	285	23.0	38.5	60.7	308	159	102	204	341	177	0
2	501	270	22.2	34.2	73.5	270	136	102	208	337	165	0
3	501	221	85.1	33.2	112	270	134	97.5	210	347	133	0
4	501	199	210	32.1	75.9	277	160	92.5	221	364	131	0
5	491	195	215	41.3	31.1	277	233	86.9	212	523	77.3	0
6	491	204	209	45.2	26.8	277	221	84.4	211	3,507	72.0	0
7	289	215	212	31.1	26.8	270	251	83.3	237	3,531	65.3	0
8	59.0	227	203	26.8	26.8	258	243	84.0	227	3,637	62.9	0
9	57.2	215	158	23.0	26.8	258	237	115	228	3,531	62.2	0
10	55.4	185	109	20.8	26.8	431	240	142	240	2,942	73.5	0
11	55.4	185	86.2	29.0	84.4	565	191	120	236	2,274	64.3	0
12	55.4	180	68.9	160	353	583	166	101	255	470	54.0	0
13	55.4	195	66.4	195	292	537	151	87.9	218	120	47.3	0
14	55.7	199	66.4	93.6	270	491	130	88.3	215	147	47.7	0
15	53.7	221	90.4	53.7	277	480	134	77.7	4,485	167	49.4	0
16	53.7	215	93.4	34.3	258	438	133	80.5	5,156	155	49.8	0
17	53.7	199	64.6	25.8	245	399	134	82.6	5,227	152	48.4	0
18	51.6	185	60.7	21.5	245	417	396	107	5,332	161	49.8	0
19	51.6	143	59.0	26.8	264	600	554	275	5,050	178	41.3	0
20	51.6	26.8	55.4	30.0	396	604	258	374	4,096	178	25.4	6.7
21	49.8	25.8	60.7	21.5	929	595	494	876	3,602	171	22.2	118
22	48.0	25.8	83.3	24.7	431	622	607	1,314	3,175	251	20.5	322
23	46.6	25.8	87.9	25.8	80.9	636	554	1,201	2,225	225	22.2	350
24	46.6	25.8	62.9	296	57.2	501	523	826	2,359	186	20.8	364
25	133	24.7	48.0	338	42.4	227	812	699	2,281	170	20.5	399
26	338	23.7	48.0	51.6	158	258	625	819	2,031	163	19.8	424
27	315	23.7	45.2	91.5	209	296	456	1,384	1,331	149	20.1	452
28	292	23.7	42.4	89.0	480	232	300	1,600	345	213	20.1	445
29	292		57.2	42.4	692	179	325	1,409	325	232	19.8	360
30	300		59.0	62.9	710	174	84.0	1,673	321	250	18.7	344
31	285		41.3		586		93.2	809		190		323
Sum	6,143.4	4,163.8	2,793.6	2,039.3	7,547.1	11,728	9,134.2	14,993.6	50,763	25,262	1,701.3	3,907.7

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	High	Low	Average	Maximum			Minimum		
	Day	Day	Day	Day	Day	Day	Day	Day			
Jan.	67.85	64.89	1	526	25	45.2	198	12,190	6,883	12,190	2,090
Feb.	66.99	64.30	1	285	#	23.7	149	8,260	2,908	8,260	85
Mar.	66.40	64.24	5	222	#	22.2	90.1	5,540	8,547	20,100	0
Apr.	67.91	64.11	25	547	#	19.1	68.0	4,040	5,250	10,300	1,410
May	71.42	64.40	21	1,360	#	26.8	243	14,970	20,230	25,600	14,970
June	70.01	66.24	24	978	30	165	391	23,260	18,180	25,800	5,480
July	69.55	65.58	25	862	30	84.0	295	18,120	6,900	18,120	360
Aug.	71.85	65.32	30	1,800	16	77.7	484	29,740	15,093	29,740	138
Sept.	75.95	66.93	18	5,400	3	199	1,690	100,690	56,875	100,690	3,970
Oct.	74.70	66.44	8	3,710	30	243	815	50,110	55,250	93,990	35,000
Nov.	66.44	64.11	1	177	30	18.7	56.7	3,370	13,755	23,300	3,370
Dec.	67.72	62.99	27	463	#	0	126	7,750	11,138	20,000	3,070
Yearly	75.95	62.99		5,400		0	384	278,040	221,009	278,040	227,189

Various days of the month. " Estimated.

CONSUMPTIVE USE OF RIVER WATER IN IRRIGATION--IN THOUSANDS OF ACRE FEET

The consumptive use of river water per acre in irrigation, i. e. the river water evaporated and transpired from irrigated land in the Rio Conchos valley from the El Paso to the Fort Quitman gauging station, was found to conform to the equation...

W = monthly rainfall on the valley floor = 88.1 % of the values shown on page 99. W hereinafter, but expressed in feet.

W = Monthly normal monthly wind velocity in miles per hour. See page 99. c and k = Monthly coefficients as follows:

Table with 3 columns: Month, c, k. Rows for Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec.

In Table 1 below there is set out the total acre feet of river water consumed in the El Paso-narrest valley on the Rio Conchos below Boquilla in the Rio Conchos valley from the El Paso to the Fort Quitman gauging station, was found to conform to the equation...

The consumptive use of river water per acre on the irrigated land from Fort Quitman to Upper Quitman was found to conform to the same equation as set out above, but in which the value of c was 1.00 in all months and the value of k was 0.00 in all months...

Over a long period of years the annual diversion duty of river water per acre of irrigated land on the Rio Conchos below Boquilla was found by the National Irrigation Commission of Mexico to have been 3.75 acre feet per acre from 1915 on lands watered directly from the Rio Conchos and 3.25 acre feet prior to 1915; 3.25 acre feet on all other primary lands and 1.54 acre feet on all secondary lands...

In these equations c = the departure from normal rainfall on the irrigated area, expressed in feet depth per year.

In Table 3 below there is set out the total acre feet of river water consumed on the irrigated lands of the Rio Conchos below Boquilla, here designated as I. The areas irrigated, designated A, are shown elsewhere in this bulletin. The annual values tabulated below were calculated by the equation I = 1A.

On irrigated lands on the Rio Conchos below Boquilla it was calculated that the annual consumptive use of river water was 2.83 acre feet per acre and that the total river water consumed each year from 1900 through 1942 was 7,700 acre feet.

In the El Paso - Juarez Valley

Table 1: Monthly and annual data for El Paso - Juarez Valley. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total.

Between Fort Quitman and Upper Presidio

Table 2: Monthly and annual data for Between Fort Quitman and Upper Presidio. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total.

On the Rio Conchos Below Boquilla.

Table 3: Monthly and annual data for On the Rio Conchos Below Boquilla. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total.

Table 4: Monthly and annual data for On the Rio Conchos Below Boquilla. Columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total.

MUNICIPAL WATER USES

Tabulated below are the yearly and monthly figures showing the amounts of water pumped into the municipal distribution systems of several towns along the Rio Grande on the United States and Mexican sides. The Del Rio Water supply comes from San Felipe Springs, the others from the Rio Grande. The municipal and industrial water supply for the El Paso area in Texas and Cd. Juarez in Chihuahua comes from deep wells. (See Outfalls from Deep Wells elsewhere in this bulletin.) These data are from the agency in charge of each diversion.

In Acre Feet

On The United States Side

Month	Del Rio				Eagle Pass				Laredo			
	1942	# Period 1931-1942			1942	Period 1932-1942			1942	Period 1931-1942		
		Average	Maximum	Minimum		Normal	Maximum	Minimum		Normal	Maximum	Minimum
Jan.	94.6	70.4	97.5	45.5	55.7	49.0	64.2	37.7	229.0	172.8	229.0	148.0
Feb.	84.9	63.3	84.9	46.0	62.7	50.9	64.3	40.2	206.8	182.1	211.0	159.0
Mar.	146.2	87.5	146.2	53.8	67.1	55.8	67.1	38.6	298.1	211.0	298.1	162.4
Apr.	125.9	105.0	125.9	79.8	79.4	69.2	85.9	60.5	320.6	254.1	320.6	145.5
May	143.3	117.1	148.7	81.4	75.7	64.9	76.3	55.4	305.4	248.9	305.4	194.6
June	190.1	139.0	190.1	92.5	108.0	79.2	108.0	49.4	412.7	287.1	412.7	182.0
July	219.3	149.2	219.3	101.1	99.3	85.5	106.0	61.2	334.1	290.5	334.1	209.1
Aug.	199.4	133.4	199.4	79.8	87.9	89.1	104.8	69.5	384.4	309.8	384.4	225.0
Sept.	116.5	111.0	152.3	65.1	49.6	77.0	98.6	49.6	274.6	265.3	309.0	212.0
Oct.	125.9	98.4	125.9	70.5	54.1	64.7	92.1	34.9	301.2	233.4	301.2	175.0
Nov.	112.5	74.0	112.5	59.3	50.6	58.2	99.9	39.9	311.4	225.3	311.4	174.0
Dec.	102.8	68.4	102.8	51.9	46.2	49.7	69.7	35.1	298.3	186.9	298.3	140.0
Yearly	1,661.4	1,216.7	1,694.0	1,006.0	836.3	793.2	914.0	673.0	3,676.6	2,867.2	3,676.6	2,448.0

Month	Roma				Rio Grande City				Brownsville				
	*1941	1942	Period 1931-1942			1942	Period 1931-1942			1942	Period 1932-1942		
			Normal	Maximum	Minimum		Normal	Maximum	Minimum		Normal	Maximum	Minimum
Jan.	14.3	2.4	9.3	14.3	2.4	24.2	18.1	24.2	13.2	117.8	76.2	117.8	58.7
Feb.	12.9	2.4	8.5	12.9	2.3	21.6	17.8	21.6	12.3	99.4	76.6	102.5	54.6
Mar.	2.0	4.0	7.9	9.5	2.0	35.4	23.1	35.4	18.6	137.5	93.4	137.5	66.2
Apr.	2.9	4.0	7.7	9.2	2.8	35.8	25.6	35.8	20.6	123.2	98.1	133.5	71.7
May	2.2	4.4	11.6	14.3	2.2	38.4	28.9	38.4	24.7	120.7	95.5	128.5	73.1
June	2.2	4.9	11.3	13.8	2.2	31.5	29.1	39.6	23.2	161.6	106.7	161.6	68.0
July	3.0	4.3	11.7	14.3	3.0	33.3	30.5	35.1	23.8	147.5	115.1	152.2	78.4
Aug.	3.5	4.3	11.7	14.3	3.5	39.5	31.0	47.7	21.2	162.3	123.6	188.0	80.0
Sept.	2.5	3.2	11.2	13.8	2.5	36.2	24.4	36.2	16.3	115.6	91.0	153.0	44.3
Oct.	3.0	3.3	7.9	9.5	2.9	35.8	23.5	35.8	14.4	151.5	95.1	151.5	66.3
Nov.	2.6	3.8	7.7	9.2	2.6	34.5	19.2	34.5	14.3	150.6	90.3	150.6	60.3
Dec.	2.3	3.3	7.8	9.5	2.3	36.0	18.9	36.0	12.8	158.1	82.4	158.1	54.9
Yearly	53.4	44.3	114.3	136.0	44.3	402.2	290.1	402.2	235.0	1,645.8	1,144.0	1,645.8	865.3

On The Mexican Side

Month	** Nuevo Laredo				Matamoros
	1942	Period 1928-1942			
		Normal	Maximum	Minimum	
January	101.0	88.3	117.9	46.8	" 68.4
February	97.5	87.9	114.2	52.5	" 68.4
March	129.7	111.9	140.0	72.7	" 68.5
April	132.7	125.4	162.6	88.4	" 68.4
May	122.8	127.7	157.1	73.0	" 68.4
June	134.2	139.5	172.9	87.1	" 68.5
July	115.2	143.3	181.5	115.2	" 68.4
August	157.2	150.9	179.2	106.6	" 68.4
September	138.7	123.5	163.9	88.2	" 68.5
October	134.1	118.3	161.2	63.1	" 68.4
November	123.6	97.6	141.0	47.2	" 66.8
December	118.0	90.9	127.8	58.1	" 70.0
Yearly	1,504.7	1,405.2	1,702.4	965.3	821.1

" Estimated # Some months missing *The monthly amounts, period normals and period maximums shown in Water Bulletin No. 11 were in error. **The yearly diversions for 1940 at Nuevo Laredo shown in Water Bulletin No. 11 as 1,563.4 acre feet is in error and should be 1,547.2 acre feet.

SUSPENDED SILT IN THE RIO GRANDE AND TRIBUTARIES — 1942

The gravimetric percentages of dried silt reported here were determined from numerous water samples taken in small necked bottles. Two methods of sampling were used.

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

B. By sampling in three bottles each at the surface of the stream, one bottle at the mid-point and one bottle at each side, one-sixth of the width from the water's edge. Numerous experiments have shown that the mean of three samples so taken gives 0.906 of the mean suspended silt in the stream cross section within reasonable limits of accuracy.*

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

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

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

For visualization and comparison the assumption is indulged here that 1,452 tons of silt would occupy one acre-foot in a reservoir bottom, which is equivalent to saying that one cubic foot of silt thus situated would weigh 65.7 pounds. See Water Bulletin No. 7, page 63, for data as to the average density of Rio Grande silt in Elephant Butte reservoir.

Month	SUSPENDED SILT									
	Tons		Number of Samples 1942	Gravimetric Percentages—1942			Acre Feet at 1,452 Tons Per Acre Foot			
	Water 1942	Silt 1942		Maximum Sample	Minimum Sample	Average	1942	Period 1934 to 1942		
							Average	Maximum	Minimum	
Sampled by U.S. Section I.B.C., Method A. # Rio Grande at San Marcial Station Analyzed by U.S. Section I.B.C., Method 1.										
January	98,668,000	181,549	30			.184	125.0	185.4	374.4	27.8
February	83,945,000	183,855	28			.219	126.6	279.5	1,027.0	23.3
March	128,599,000	485,532	30			.376	333.0	321.5	1,012.0	45.5
April	587,182,000	3,141,424	30			.555	2,465.5	651.3	3,780.0	18.6
May	860,816,000	3,804,307	31			.442	2,620.4	1,617.4	5,610.4	5.8
June	562,073,000	2,135,877	30			.380	1,171.0	1,265.2	9,322.0	2.4
July	57,356,000	180,671	31			.515	124.4	1,041.4	6,672.0	0.0
August	46,487,000	446,275	30			.960	307.4	1,828.2	11,710.0	83.4
September	70,728,000	766,692	33			1.084	528.0	2,541.4	17,470.0	156.4
October	47,253,000	201,298	31			.426	138.6	847.8	6,520.0	0.0
November	26,047,000	39,591	29			.152	27.5	147.4	604.8	7.2
December	68,133,000	118,551	31			.174	81.6	158.6	346.4	30.3
Yearly	2,637,285,000	11,684,102	364			.443	8,046.8	11,064.9	41,317.6	2,459.7

Month	Rio Grande at Eagle Pass Station Analyzed by U.S. Dept. Agr., Method 2.									
	Tons		Number of Samples 1942	Gravimetric Percentages—1942			Acre Feet at 1,452 Tons Per Acre Foot			
	Water 1942	Silt 1942		Maximum Sample	Minimum Sample	Average	1942	Period 1934 to 1942		
							Average	Maximum	Minimum	
Sampled by Mex. Section I.B.C., Method B. # Rio Grande at Eagle Pass Station Analyzed by U.S. Dept. Agr., Method 2.										
January	307,076,000	59,516	29	.026	.003	.013	27.2	24.5	124.0	.1
February	246,610,000	84,867	18	.048	.003	.019	31.6	15.1	32.1	2.6
March	230,887,000	44,001	19	.037	.003	.019	30.3	187.9	187.9	4.7
April	190,217,000	77,311	28	.352	.003	.041	53.2	56.6	204.3	3.0
May	475,798,000	833,536	25	.584	.030	.175	574.1	855.0	4,217.8	31.2
June	450,123,000	612,604	6	.267	.078	.156	421.9	1,254.2	3,821.0	24.5
July	359,100,000	369,092	19	.231	.056	.103	254.2	1,446.1	7,835.8	95.2
August	731,766,000	7,705,665	29	1.507	.055	1.055	5,306.9	1,361.8	5,306.9	217.8
September	2,039,889,000	15,635,622	6	1.289	.095	.748	10,802.8	3,596.9	10,802.8	60.7
October	979,448,000	912,373	30	.332	.024	.117	628.4	1,312.0	5,816.7	150.0
November	435,262,000	265,268	30	.156	.030	.061	182.7	150.0	305.5	14.3
December	307,049,000	76,095	19	.048	.018	.025	52.4	27.7	84.1	1.1
Yearly	6,609,225,000	26,666,910	257	1.507	.003	.403	18,365.7	10,714.0	20,842.8	1,768.3

Month	Rio Alamo Station Analyzed by Mex. Section I.B.C., Method 2.									
	Tons		Number of Samples 1942	Gravimetric Percentages—1942			Acre Feet at 1,452 Tons Per Acre Foot			
	Water 1942	Silt 1942		Maximum Sample	Minimum Sample	Average	1942	Period 1934 to 1942		
							Average	Maximum	Minimum	
Sampled by Mex. Section I.B.C., Method B. # Rio Alamo Station Analyzed by Mex. Section I.B.C., Method 2.										
January	1,093,000	0	8	0	0	0	0	4.4	21.8	0
February	695,000	0	8	0	0	0	0	.1	.6	0
March	662,000	0	6	0	0	0	0	7.6	45.4	0
April	3,549,000	3,336	9	.180	0	.094	2.3	32.6	227.4	0
May	16,539,000	99,361	8	.434	0	.359	40.9	92.4	229.7	7.0
June	31,799,000	111,932	10	.546	0	.352	77.1	88.4	471.0	0
July	30,778,000	134,808	10	.792	0	.438	92.8	31.9	92.8	0
August	1,746,000	0	7	0	0	0	0	90.3	396.0	0
September	13,852,000	24,102	10	.296	0	.174	16.6	104.6	362.9	1.5
October	33,643,000	210,942	9	.776	0	.627	145.5	101.1	597.9	0
November	2,911,000	0	7	0	0	0	0	1.4	5.2	0
December	2,286,000	0	7	0	0	0	0	2.4	16.1	0
Yearly	139,509,000	544,481	100	.792	0	.390	375.0	524.2	1,198.6	154.5

Month	# Rio Grande at Roma Station Analyzed by U.S. Dept. Agr., Method 2.									
	Tons		Number of Samples 1942	Gravimetric Percentages—1942			Acre Feet at 1,452 Tons Per Acre Foot			
	Water 1942	Silt 1942		Maximum Sample	Minimum Sample	Average	1942	Period 1934 to 1942		
							Average	Maximum	Minimum	
Sampled by Mex. Section I.B.C., Method B. # Rio Grande at Roma Station Analyzed by U.S. Dept. Agr., Method 2.										
January	357,374,000	46,102	31	.042	.006	.013	33.1	43.8	163.7	.4
February	279,980,000	12,978	28	.015	.001	.005	8.9	30.5	121.0	.8
March	269,103,000	45,978	31	.037	.006	.017	31.7	166.7	1,825.3	1.3
April	238,627,000	84,965	25	.158	.011	.036	58.5	269.5	1,345.0	.7
May	663,425,000	1,903,175	31	.851	.015	.287	1,310.7	1,416.4	5,232.4	88.6
June	529,629,000	761,716	28	.408	.047	.144	524.6	1,400.9	7,216.0	92.7
July	909,091,000	3,717,091	31	1.700	.033	.409	2,360.0	1,496.2	9,070.0	19.3
August	667,444,000	1,480,951	30	1.188	.036	.696	3,017.1	1,439.3	5,251.2	13.2
September	2,227,432,000	10,480,225	30	1.176	.240	.457	7,224.6	4,358.0	17,998.0	42.8
October	990,944,000	2,603,607	31	.590	.044	.263	1,793.1	2,354.3	9,241.0	133.0
November	460,506,000	310,215	30	.277	.030	.067	213.6	159.3	699.7	4.8
December	331,834,000	68,636	31	.033	.009	.021	47.3	64.9	319.0	1.0
Yearly	7,991,389,000	24,427,621	357	1.188	.001	.306	16,823.2	13,391.8	30,839.0	2,334.0

Month	Rio San Juan Station Analyzed by Mex. Section I.B.C., Method 2.									
	Tons		Number of Samples 1942	Gravimetric Percentages—1942			Acre Feet at 1,452 Tons Per Acre Foot			
	Water 1942	Silt 1942		Maximum Sample	Minimum Sample	Average	1942	Period 1934 to 1942		
							Average	Maximum	Minimum	
Sampled by Mex. Section I.B.C., Method B. # Rio San Juan Station Analyzed by Mex. Section I.B.C., Method 2.										
January	63,422,000	0	13	0	0	0	0	41.8	335.6	0
February	33,202,000	0	12	0	0	0	0	1.3	10.2	0
March	19,116,000	0	14	0	0	0	0	0	36.7	0
April	42,136,000	103,282	18	.510	0	.245	71.1	19.2	71.1	0
May	57,839,000	24,871	18	.117	0	.043	17.1	285.9	1,062.0	1.6
June	397,168,000	2,827,836	29	1.291	0	.712	1,947.5	742.3	2,392.0	0
July	257,517,000	659,244	21	.761	0	.296	454.00	184.6	857.8	.9
August								‡ 1,335.2	‡ 8,932.0	‡ 0
September								‡ 671.7	‡ 2,148.0	‡ 3.3
October								‡ 499.7	‡ 3,133.1	‡ .3
November								‡ 16.2	‡ 6.3	‡ 0
December								‡ 261.7	‡ 0	‡ 0

* See Tech. Bull. No. 382, 1933 U.S. Dept. Agr. † Period 1925 - 1942 ‡ Period 1934 - 1941 § Period 1929 - 1942

**CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE
AND TRIBUTARIES - 1942**

Month	No. of Samples	Total Tons of		Mean Kals @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	Cl	NO ₃
Jan.	31	1.72	22,400	191	0.35	8.1	59	56	5.67	2.19	11.40	5.91	8.49	7.07	0.01
Feb.	28	0.92	48,000	104	0.13	7.7	49	25	3.94	1.34	4.98	3.15	4.70	2.62	0.02
Mar.	31	0.89	55,600	101	0.12	8.1	49	26	3.74	1.28	4.85	3.09	4.44	2.62	0.01
Apr.	30	0.82	114,000	92.2	0.12	8.1	48	22	3.49	1.23	4.33	2.90	4.18	2.05	0.01
May	30	0.72	257,000	79.4	0.10	8.1	45	19	3.31	1.09	3.54	2.82	3.74	1.55	0.01
June	30	0.70	215,000	78.5	0.12	7.7	44	18	3.28	1.10	3.42	2.82	3.65	1.45	0.02
July	31	0.74	147,000	82.6	0.11	7.7	45	21	3.41	1.11	3.75	2.87	3.56	1.75	0.02
Aug.	30	0.76	120,000	84.5	0.12	7.9	46	22	3.46	1.14	3.88	3.02	3.69	1.90	0.01
Sept.	30	0.74	127,000	81.9	0.18	8.0	44	21	3.42	1.08	3.60	2.99	3.59	1.80	0.01
Oct.	31	1.01	58,500	114	0.17	7.9	50	27	4.31	1.42	5.72	3.54	4.89	3.15	0.03
Nov.	30	1.45	30,400	160	0.24	8.2	55	32	5.53	1.91	8.98	4.43	6.93	5.30	0.02
Dec.	31	1.32	33,800	146	0.20	8.1	52	31	5.34	1.80	7.84	4.23	6.30	4.70	0.01
Mean #	365	0.787	1,226,700	87.6	0.128		46	22	3.52	1.17	4.05	2.98	3.94	1.95	0.014
Period Average	#1.12	#	#669,000	123			52	29	4.52	1.65	6.77	3.50	5.54	3.91	
Tons of Constituents, 1942									150,000	30,200	198,000	195,000	401,000	147,000	
Average Tons Period 1930-1942									73,900	16,400	127,000	87,000	217,000	113,000	

Water Samples from Rio Grande at Fort Quitman Station

Jan.	7	2.88	57,900	323	0.39	8.1	61	54	9.37	3.48	20.25	4.53	10.86	17.88	0.05
Feb.	6	1.71	85,700	195	0.23	7.8	57	46	6.08	2.25	11.03	3.65	6.90	8.95	0.04
Mar.	6	1.66	64,600	192	0.21	7.8	58	47	5.66	2.21	11.00	3.15	6.85	8.95	0.01
Apr.	10	1.25	96,200	144	0.17	8.1	57	43	4.25	1.75	7.93	2.40	5.57	5.95	0.04
May	10	0.94	290,000	107	0.13	8.1	54	35	3.59	1.43	5.58	2.38	4.61	3.51	0.02
June	11	0.94	226,000	109	0.20	7.8	51	32	3.80	1.40	5.38	2.77	4.50	3.51	0.03
July	9	1.19	187,000	135	0.17	7.8	53	38	4.66	1.54	7.06	3.17	5.13	5.16	0.03
Aug.	6	1.25	159,000	143	0.18	7.9	55	42	4.70	1.71	7.74	3.17	5.03	5.96	0.03
Sept.	8	1.07	157,000	122	0.18	8.0	52	36	4.30	1.46	6.23	3.19	4.67	4.35	0.01
Oct.	7	1.56	104,000	178	0.21	7.8	59	46	5.13	2.04	10.27	3.04	6.54	8.15	0.03
Nov.	6	2.38	56,600	269	0.31	8.1	62	51	7.48	2.98	16.88	3.98	9.46	13.95	0.05
Dec.	7	2.05	63,600	231	0.25	7.9	59	47	6.92	2.54	13.82	4.13	8.24	11.15	0.03
Mean #	93	1.20	1,527,600	137	0.182	7.94	55	40	4.42	1.66	7.41	2.93	5.29	5.42	0.026
Period Average	#2.20	#	#593,000	242			60	54	7.17	2.83	15.21	3.48	8.02	13.72	
Tons of Constituents, 1942									153,000	34,900	294,000	154,000	459,000	332,000	
Average Tons Period 1930-1942									53,400	12,800	130,000	39,500	143,000	181,000	

Water Samples from Rio Grande at Upper Presidio Station

Jan.	6	3.25	70,800	364	0.40	8.0	62	57	9.82	4.18	23.22	3.45	12.54	21.31	0.05
Feb.	6	1.68	69,500	193	0.23	7.8	58	45	5.85	2.26	11.03	3.46	7.14	8.80	0.04
Mar.	4	1.71	66,900	198	0.22	8.0	58	47	5.90	2.29	11.31	3.27	7.24	9.31	0.01
Apr.	7	1.94	79,500	218	0.22	8.1	58	49	6.52	2.56	12.53	3.27	7.89	10.55	0.01
May	9	1.18	285,000	135	0.15	8.1	53	38	4.72	1.66	7.06	3.27	5.44	4.45	0.02
June	6	1.14	246,000	131	0.16	7.9	53	36	4.53	1.61	6.85	3.22	5.24	4.71	0.03
July	6	1.26	197,000	141	0.19	7.9	54	39	4.81	1.64	7.57	3.17	5.41	5.46	0.03
Aug.	4	1.29	172,000	147	0.17	8.2	55	42	5.05	1.58	8.02	3.07	5.48	6.16	0.02
Sept.	7	1.18	178,000	131	0.21	8.0	53	38	4.49	1.54	6.86	3.19	4.99	4.95	0.01
Oct.	4	1.58	125,000	180	0.25	7.8	57	45	5.64	1.98	10.21	3.24	6.67	8.10	0.01
Nov.	4	2.60	71,000	293	0.36	7.9	62	53	7.99	3.38	18.41	3.44	10.48	15.90	0.01
Dec.	3	2.25	69,500	254	0.30	8.0	61	50	7.15	2.93	15.69	3.69	9.18	13.10	0.01
Mean #	66	1.38	1,627,200	157	0.27	7.95	55	41	5.14	1.84	8.65	3.24	5.99	6.54	0.021
Period Average	1.78	#	#563,000	202			58	49	6.22	2.25	11.71	3.08	7.15	10.02	
Tons of Constituents, 1942									165,000	35,800	318,000	158,000	460,000	371,000	
Average Tons Period 1935-1942									53,700	11,800	116,000	40,400	148,000	153,000	

Water Samples from Rio Conchos near Ojinaga, Chihuahua

Jan.	7	0.80	49,200	85.9	0.20	8.0	39	13	4.34	1.05	3.41	3.20	4.34	1.11	0.03
Feb.	5	0.88	38,400	93.5	0.15	8.0	40	14	4.49	1.19	3.80	3.15	5.02	1.36	0.01
Mar.	5	0.80	38,300	86.4	0.14	8.1	38	14	4.31	1.07	3.28	3.09	4.45	1.21	0.01
Apr.	6	0.97	23,500	103	0.18	8.1	46	21	4.30	1.29	4.68	2.89	5.54	2.20	0.01
May	5	1.07	33,100	116	0.17	7.9	46	21	5.01	1.36	5.38	2.87	6.59	2.45	0.01
June	4	0.86	43,900	88.1	0.16	7.9	42	15	4.04	1.11	3.80	2.77	4.91	1.40	0.03
July	6	0.98	49,000	100	0.17	7.7	40	17	5.00	1.07	3.98	2.33	6.18	1.80	0.03
Aug.	6	0.45	173,000	48.3	0.07	7.9	29	10	2.93	0.49	1.39	2.18	2.08	0.50	0.04
Sept.	6	0.32	375,000	33.5	0.08	7.9	26	6	2.07	0.45	0.90	2.24	2.03	0.20	0.03
Oct.	5	0.48	116,000	51.4	0.08	7.8	32	9	2.93	0.61	1.65	2.69	2.06	0.45	0.02
Nov.	4	0.60	65,400	63.8	0.07	7.9	35	11	3.43	0.75	2.27	2.94	2.82	0.70	0.01
Dec.	4	0.61	47,800	64.8	0.09	7.8	35	12	3.48	0.79	2.35	2.89	2.90	0.80	0.03
Mean #	63	0.46	1,052,600	48.5	0.12	7.82	32	10	2.74	0.59	1.58	2.42	1.97	0.50	0.028
Period Average	0.54	#	#72,000	57.8			36	13	3.10	0.73	2.16	2.46	2.68	0.79	
Tons of Constituents, 1942									171,000	22,400	113,000	230,000	295,000	55,300	
Average Tons Period 1935-1942									106,000	15,200	84,800	128,000	219,000	47,900	

** Percent of Total Cations

Weighted Mean

Period 1929 - 1942

*** Percent of Total Anions

† Total

CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE AND TRIBUTARIES—1942

Month	No. of Samples	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	Cl	NO ₃
Jan.	15	6.58	515,000	643	0.40	7.8	54	54	20.79	13.26	39.40	2.68	30.91	40.20	0.05
Feb.	14	6.77	422,000	671	0.38	7.7	54	55	20.65	14.23	41.21	2.46	31.68	42.38	0.04
Mar.	16	8.05	328,000	822	0.48	7.5	60	61	19.58	17.10	54.79	1.70	33.80	56.34	0.02
Apr.	15	7.51	196,000	780	0.50	7.7	63	63	15.73	16.18	53.35	1.13	30.15	53.88	0.02
May	15	6.00	271,000	619	0.40	7.6	56	56	17.42	12.36	37.94	1.34	28.41	38.33	0.03
June	14	5.69	196,000	580	0.40	7.4	52	53	18.38	12.14	33.67	1.63	28.71	34.19	0.03
July	16	6.29	131,000	670	0.42	7.7	61	62	14.85	13.36	45.94	2.43	24.84	44.84	0.03
Aug.	15	5.43	238,000	566	0.35	8.1	59	60	14.19	11.14	36.46	2.53	22.17	36.57	0.03
Sept.	15	4.97	279,000	504	0.33	7.9	53	54	15.74	9.90	29.06	2.44	23.25	29.75	0.04
Oct.	16	4.94	246,000	498	0.36	7.8	51	51	16.97	9.84	28.14	2.34	24.85	28.20	0.03
Nov.	15	5.15	302,000	495	0.31	7.8	47	46	19.52	10.02	26.15	1.74	28.27	26.10	0.03
Dec.	15	5.50	267,000	524	0.28	7.9	49	49	19.28	10.62	28.65	2.34	27.06	29.00	0.03
Mean #	181 †	5.99	5,391,000 ‡	602	0.375	7.76 †	54	55	18.21	12.27	36.48	2.14	28.09	37.06	0.034
Period Average		4.12	1,980,000	427			53	53	13.88	7.97	24.26	2.69	18.94	24.45	
Tons of Constituents, 1942									281,000	115,000	646,000	50,300	1,039,000	1,012,000	
Average Tons Period 1935-1942									182,000	63,400	365,000	53,700	595,000	567,000	

Water Samples from Pecos River Station

Jan.	7	2.75	621,000	299	0.23	7.6	51	50	9.69	5.48	15.98	2.63	12.96	15.66	0.05
Feb.	5	2.71	492,000	295	0.24	7.6	52	49	9.28	5.30	15.81	3.09	12.36	15.19	0.05
Mar.	5	2.61	443,000	295	0.24	7.9	57	54	7.49	5.16	17.06	2.71	10.98	16.25	0.05
Apr.	7	1.97	276,000	228	0.21	7.9	56	55	5.21	4.00	12.70	2.20	8.32	12.00	0.03
May	6	1.71	598,000	123	0.18	7.8	53	54	6.20	2.99	10.17	2.72	8.05	8.62	0.04
June	3	1.47	487,000	163	0.11	8.1	49	38	6.02	2.51	8.04	3.02	7.33	6.31	0.05
July	5	1.45	383,000	164	0.23	7.8	53	43	5.22	2.43	8.72	2.97	6.31	6.96	0.04
Aug.															
Sept.	7	0.87	1,809,000	95.4		7.9	44	32	3.96	1.26	4.09	2.29	4.02	3.00	0.04
Oct.	7	1.01	379,000	114	0.13	7.7	45	36	4.32	1.61	4.98	2.69	4.40	4.05	0.04
Nov.	7	1.88	506,000	174	0.20	7.9	46	41	6.69	2.81	8.03	2.64	7.81	7.15	0.05
Dec.	7	1.64	370,000	179	0.15	7.9	49	43	6.16	3.10	8.80	2.09	6.19	7.80	0.05
Mean #	66 †	1.35	6,544,000 ‡	150		7.9	49	41	5.32	2.32	7.32	2.53	6.24	6.23	0.043
Period Average		1.18	4,370,000	132			46	39	5.16	2.06	6.09	2.53	5.47	5.16	
Tons of Constituents, 1942									705,000	186,000	1,113,000	510,000	1,981,000	1,460,000	
Average Tons Period 1935-1942									520,000	126,000	704,000	387,000	1,322,000	920,000	

Water Samples from Rio Grande at Eagle Pass Station

Jan.	7	.81	3,470	93.7	0.24	7.9	37	30	4.18	1.73	3.44	2.73	3.77	2.78	0.07
Feb.	6	1.08	1,640	120	0.28	7.7	39	30	5.02	2.42	4.72	2.65	5.77	3.62	0.05
Mar.	7	1.45	1,520	155	0.43	8.1	42	33	5.95	3.22	6.73	2.14	8.49	5.28	0.02
Apr.	9	3.13	25,200	314	1.10	7.8	48	35	11.24	6.64	16.33	1.70	20.18	12.55	0.02
May	13	1.26	63,600	201	0.82	7.7	47	33	7.32	3.79	9.95	1.88	12.27	7.06	0.03
June	8	0.41	664	47.6	0.17	7.4	34	23	2.38	0.64	1.55	1.78	1.79	1.05	0.03
July	17	0.65	24,900	73.2	0.14	7.4	39	26	3.23	1.12	2.85	1.53	3.68	1.85	0.04
Aug.	14	0.60	1,600	68.3	0.25	7.9	41	25	2.93	1.04	2.72	2.23	2.78	1.70	0.01
Sept.	10	0.72	37,900	81.2	0.24	7.9	36	23	4.00	1.20	2.92	2.34	3.91	1.90	0.05
Oct.	14	0.83	20,200	91.6	0.28	7.9	39	26	4.06	1.43	3.53	1.84	4.86	2.35	0.05
Nov.	4	0.67	724	75.9	0.27	7.8	35	23	3.76	1.33	2.60	1.94	3.77	1.70	0.02
Dec.	13	0.64	563	71.9	0.14	8.0	36	25	3.40	1.27	2.55	2.24	3.19	1.80	0.01
Mean #	122 †	1.08	181,981 ‡	116		7.74	42	29	4.81	2.00	5.02	1.97	6.38	3.50	0.042
Period Average		1.07	263,200	110			41	28	4.87	1.99	4.78	1.88	6.45	3.32	
Tons of Constituents, 1942									22,200	5,590	26,500	13,800	70,500	28,500	
Average Tons Period 1935-1942									32,800	8,130	36,900	19,300	104,000	39,500	

Water Samples from Rio Salado Station

Jan.	4	0.99	46,200	105	0.22	7.9	32	20	5.03	2.47	3.53	2.78	5.86	2.12	0.10
Feb.	4	0.96	23,400	103	0.18	7.7	35	21	4.49	2.38	3.76	2.65	5.64	2.21	0.13
Mar.	4	0.82	11,500	86.0	0.14	8.1	34	18	3.92	2.00	3.05	2.32	4.77	1.61	0.06
Apr.	6	0.99	30,700	111	0.24	7.7	49	32	3.66	1.87	5.25	1.77	5.64	3.45	0.04
May	5	0.69	29,400	77.5	0.15	7.8	39	22	3.15	1.45	3.00	1.98	3.94	1.70	0.06
June	9	0.54	158,000	60.0	0.12	7.8	34	21	2.93	0.94	2.02	2.28	2.43	1.25	0.04
July	6	0.53	100,000	58.5	0.15	7.9	27	17	3.28	1.11	1.66	2.48	2.51	1.00	0.13
Aug.	5	0.59	46,700	65.5	0.09	7.9	31	18	3.39	1.19	2.02	2.48	2.82	1.20	0.07
Sept.	8	0.71	92,100	76.6	0.02	7.8	32	18	3.90	1.39	2.53	2.34	4.00	1.45	0.07
Oct.	7	0.58	113,000	63.7	0.10	7.8	25	13	3.76	1.06	1.60	2.49	3.08	0.85	0.07
Nov.	4	0.90	45,200	95.6	0.24	7.9	35	21	4.13	2.24	3.50	2.34	5.36	2.05	0.07
Dec.	4	1.08	38,900	113	0.23	7.9	39	23	4.28	2.74	4.55	1.94	6.90	2.73	0.14
Mean #	66 †	0.65	735,100 ‡	71.1		7.84	32	19	3.53	1.33	2.32	2.37	3.38	1.38	0.076
Period Average		0.63	594,000	68.6			33	21	3.45	1.24	2.34	2.32	3.12	1.46	
Tons of Constituents, 1942									109,000	24,800	82,300	111,000	249,000	75,200	
Average Tons Period 1935-1942									88,700	19,400	68,900	90,800	192,000	66,300	

Water Samples from Rio San Juan Station

Jan.	4	0.99	46,200	105	0.22	7.9	32	20	5.03	2.47	3.53	2.78	5.86	2.12	0.10
Feb.	4	0.96	23,400	103	0.18	7.7	35	21	4.49	2.38	3.76	2.65	5.64	2.21	0.13
Mar.	4	0.82	11,500	86.0	0.14	8.1	34	18	3.92	2.00	3.05	2.32	4.77	1.61	0.06
Apr.	6	0.99	30,700	111	0.24	7.7	49	32	3.66	1.87	5.25	1.77	5.64	3.45	0.04
May	5	0.69	29,400	77.5	0.15	7.8	39	22	3.15	1.45	3.00	1.98	3.94	1.70	0.06
June	9	0.54	158,000	60.0	0.12	7.8	34	21	2.93	0.94	2.02	2.28	2.43	1.25	0.04
July	6	0.53	100,000	58.5	0.15	7.9	27	17	3.28	1.11	1.66	2.48	2.51	1.00	0.13
Aug.	5	0.59	46,700	65.5	0.09	7.9	31	18	3.39	1.19	2.02	2.48	2.82	1.20	0.07
Sept.	8	0.71	92,100	76.6	0.02	7.8	32	18	3.90	1.39	2.53	2.34	4.00	1.45	0.07
Oct.	7	0.58	113,000	63.7	0.10	7.8	25	13	3.76	1.06	1.60	2.49	3.08	0.85	0.07
Nov.	4	0.90	45,200	95.6	0.24	7.9	35	21	4.13	2.24	3.50	2.34	5.36	2.05	0.07
Dec.	4	1.08	38,900	113	0.23	7.9	39	23	4.28	2.74	4.55	1.94	6.90	2.73	0.14
Mean #	66 †	0.65	735,100 ‡	71.1		7.84	32	19	3.53	1.33	2.32	2.37	3.38	1.38	0.076
Period Average		0.63	594,000	68.6			33	21	3.45	1.24	2.34	2.32	3.12	1.46	
Tons of Constituents, 1942									109,000	24,800	82,300	111,000	249,000	75,200	
Average Tons Period 1935-1942									88,700	19,400	68,900	90,800	192,000	66,300	

** Percent of Total Cations

*** Percent of Total Anions

† Weighted Mean
‡ Total

CHEMICAL ANALYSES OF WATER SAMPLES FROM RIO GRANDE AND TRIBUTARIES—1942

Month	No. of Samples	Total Tons of		Mean Kx10 ⁶ @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	Cl	NO ₃

Water Samples from Rio Grande at Rio Grande City

Jan.	13	2.41	762,000	264	0.22	7.8	51	48	8.56	4.84	13.89	2.68	11.55	13.23	0.04
Feb.	11	2.49	575,000	274	0.24	7.8	51	49	8.49	5.15	14.43	2.33	12.02	14.03	0.04
Mar.	13	2.25	484,000	252	0.22	7.8	56	52	6.48	4.60	13.95	1.45	10.77	13.05	0.04
Apr.	15	2.02	396,000	227	0.27	8.1	58	52	5.31	4.15	12.91	1.33	9.37	11.65	0.03
May	18	1.22	616,000	143	0.17	7.8	54	46	4.15	2.24	7.40	1.75	5.64	6.36	0.05
June	17	0.95	610,000	109	0.23	7.8	51	38	3.46	1.62	5.39	1.83	4.65	4.01	0.04
July	19	0.73	628,000	84.6	0.15	7.7	49	37	2.92	1.22	4.01	1.83	3.16	3.01	0.05
Aug.	15	1.12	582,000	127	0.17	7.8	51	40	4.31	1.82	6.42	2.28	5.15	4.96	0.07
Sept.	16	0.57	1,038,000	65.6	0.11	7.8	40	26	3.06	0.78	2.54	2.44	2.30	1.70	0.05
Oct.	13	0.75	719,000	85.0	0.13	7.8	41	30	3.77	1.17	3.38	2.29	3.28	2.55	0.05
Nov.	15	1.28	504,000	144	0.15	8.0	46	39	5.49	2.39	6.59	2.59	6.16	5.60	0.05
Dec.	13	1.60	461,000	174	0.20	8.0	47	41	6.35	3.15	8.32	2.14	8.46	7.25	0.05
Mean #	178	1.06	7,375,000	120	0.161	7.82	49	40	4.22	1.88	5.77	2.21	4.89	4.79	0.049
Period Average	0.89		4,709,000	101			44	36	4.01	1.60	4.37	2.33	4.05	3.54	
Tons of Constituents, 1942									799,000	216,000	1,254,000	627,000	2,319,000	1,605,000	
Average Tons Period 1935-1942									580,000	140,000	726,000	505,000	1,405,000	907,000	

Water Samples from North Floodway Near Sebastian, Texas

Jan. to June	12	2.29	39,300	251	0.75	7.8	55	52	6.98	4.36	13.82	2.18	9.92	13.28	0.01
July to Dec.	11	1.99	27,100	223	0.78	7.9	55	49	6.47	3.74	12.29	2.54	8.86	11.00	0.03
Mean #	23	2.16	66,400	239	0.763	7.84	55	51	6.75	4.09	13.14	2.34	9.45	12.27	0.019
Period Average	1.84		99,800	203			52	52	6.27	3.25	10.49	2.97	6.77	10.39	
Tons of Constituents, 1942									5,670	2,080	12,700	2,940	19,000	18,200	
Average Tons Period 1941-1942									9,260	2,920	17,800	6,370	24,000	27,200	

Water Samples from Rio Grande at El Paso Station — 1929

Mean #	27	1.10	605,800												
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Water Samples from Rio Grande at El Paso Station — 1930

Mean #	34	1.34	714,800	143			58	39	4.66	1.99	9.06	3.93	5.58	6.10	
Tons of Constituents, 1930									67,600	17,500	151,000	86,800	194,000	157,000	

Water Samples from Rio Grande at Fort Quitman Station — 1929

Mean #	49	2.88	610,700												
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Water Samples from Rio Grande at Fort Quitman Station — 1930

Mean #	42	2.78	523,300	316			59	61	9.74	3.80	19.38	3.53	9.12	20.05	
Tons of Constituents, 1930									49,800	11,800	114,000	27,500	112,000	182,000	

Water Samples from Rio Grande at Fort Quitman Station — 1935

Jan.	4	#5.51	#18,800	399	0.38	7.9	63	60	10.65	4.35	25.05	4.03	12.18	24.45	0.01
Feb.	4	#5.52	#12,400	394	0.41	7.8	65	60	10.43	4.56	25.17	4.08	12.24	24.24	0.07
Mar.	5	#4.49	#4,890	488	0.43	8.0	61	64	13.67	6.22	30.79	4.52	13.62	32.59	0.05
Apr.	4	4.97	5,960	544	0.45	8.0	63	66	14.03	6.48	35.40	4.08	14.91	37.47	0.04
May ##	5	5.76	5,070	641	0.61	8.0	62	67	16.49	8.13	40.95	5.09	16.88	45.96	tr.
June	4	#2.50	#9,080	303	0.33	7.5	62	60	8.22	2.96	18.45	2.65	9.33	17.88	0.02
July	4	#2.78	#12,000	327	0.32	7.7	61	60	8.57	3.91	19.80	3.02	9.87	19.60	0.09
Aug. ##	5	1.64	39,900	190		8.1	56	47	6.06	2.11	10.32	3.72	6.32	8.83	0.07
Sept. ##	4	2.01	115,000	229		7.7	57	50	7.18	2.62	13.07	3.84	7.76	11.54	0.06
Oct. ##	4	2.58	53,400	305	0.40	7.7	66	56	7.72	2.58	19.77	2.93	10.24	16.80	tr.
Nov.	5	3.51	36,900	402	0.35	8.2	62	61	11.14	4.25	25.36	4.05	11.97	24.90	0.04
Dec. ##	4	2.97	37,700	339	0.34	7.9	60	56	9.60	4.03	20.56	4.54	10.64	19.07	tr.
Mean #	452	2.42	351,100	277		7.83	60	54	8.00	3.02	16.66	3.74	8.96	15.21	0.045
Tons of Constituents, 1935									31,700	7,260	75,800	22,200	85,100	107,000	

** Percent of Total Cations
 *** Percent of Total Anions
 # Revision of figures published in W. B. 5.
 ## These monthly values are from improved computations over those used in W. B. 5, Page 47.

ELECTRICAL CONDUCTANCE OF WATER SAMPLES

1942

San Marcial Station

Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C
Jan. 1	64.1	Feb. 12	63.3	Mar. 26	59.1	May 6	45.3	June 17	31.1	July 28	77.4	Sept. 8	65.2	Oct. 16	81.6
2	65.7	3	66.8	27	57.6	7	48.8	18	31.2	29	79.6	9	58.9	17	78.1
3	64.9	14	66.4	28	63.0	8	43.0	19	32.9	30	69.8	10	68.4	18	73.7
4	65.0	15	66.8	29	60.6	9	42.1	20	32.9	31	65.9	11	74.8	19	70.8
5	64.1	16	67.0	30	64.9	10	40.4	21	34.4	1	68.2	13	70.2	20	68.8
6	65.0	17	67.2	31	59.5	11	39.9	22	33.5	2	77.6	15	66.7	21	70.1
7	66.9	18	67.2	Apr. 1	64.5	12	40.3	23	32.4	3	70.5	16	67.7	22	70.5
8	67.2	19	68.2	2	60.0	13	38.8	24	35.9	4	75.4	17	79.6	23	74.6
9	66.6	20	69.9	3	61.6	14	37.9	25	35.8	5	70.7	18	70.7	24	74.6
10	69.6	21	67.1	4	62.4	15	36.8	26	34.8	6	70.6	19	69.4	25	74.4
11	70.6	22	67.6	5	59.9	16	37.4	27	35.8	7	74.2	20	76.7	26	77.5
12	66.4	23	65.0	6	65.5	17	36.5	28	34.8	8	74.2	21	62.1	27	77.5
13	67.7	24	72.1	7	59.6	18	38.9	29	40.3	9	65.9	17	74.6	28	79.5
14	67.0	25	69.7	8	63.5	19	35.9	30	40.4	10	79.1	18	70.6	29	77.4
15	67.8	26	70.2	9	59.6	20	35.2	1	49.9	11	72.9	19	70.6	30	80.0
16	66.0	27	68.2	10	59.9	21	35.2	2	47.8	12	67.0	20	68.7	31	88.1
17	67.0	28	68.9	11	60.4	22	37.6	3	52.5	13	71.5	21	69.1	1	81.2
18	66.5	29	66.8	12	51.1	23	34.7	4	53.9	14	76.6	22	65.0	2	82.4
19	66.5	Mar. 1	65.4	13	50.5	24	35.2	5	79.4	15	76.7	23	66.1	3	81.0
20	56.5	2	67.9	14	50.4	25	35.5	6	59.6	16	73.4	24	67.3	4	81.8
21	64.4	3	70.2	15	51.6	26	34.2	7	58.2	17	61.8	25	65.3	5	79.9
22	64.0	4	70.4	16	49.6	27	33.4	8	57.5	18	75.3	26	68.0	6	79.9
23	68.4	5	70.5	17	46.2	28	35.6	9	61.7	19	69.1	27	67.7	7	80.8
24	68.4	6	70.4	18	52.8	29	34.0	10	61.6	20	69.4	28	69.4	8	81.6
25	70.4	7	70.2	19	51.1	30	35.5	11	67.8	21	70.6	29	70.6	9	88.1
26	68.8	8	65.7	20	59.9	31	31.8	12	71.7	22	69.1	30	69.1	10	88.1
27	68.5	9	64.4	21	58.8	June 1	31.8	13	65.1	23	68.6	1	68.4	11	86.9
28	65.5	10	64.5	22	44.5	2	31.5	14	63.3	24	81.3	2	68.4	12	89.6
29	66.7	11	64.5	23	43.9	3	30.9	15	64.0	25	81.3	3	70.3	13	92.1
30	68.7	12	64.5	24	42.8	4	30.2	16	64.0	26	81.3	4	73.3	14	92.1
31	68.7	13	64.5	25	41.5	5	29.3	17	59.8	28	101	5	70.2	15	94.5
Feb. 1	69.4	14	64.4	26	41.6	6	31.4	18	63.1	29	86.8	6	73.1	16	97.7
2	65.9	15	64.4	27	40.5	7	32.8	19	65.7	30	85.7	7	71.9	17	96.6
3	65.9	16	64.4	28	40.5	8	36.8	20	70.2	1	84.1	8	74.6	18	96.6
4	66.1	17	64.4	29	40.5	9	35.7	21	64.9	2	82.0	9	75.6	19	94.9
5	65.5	18	64.2	30	44.0	10	31.7	22	65.5	3	82.0	10	74.7	20	94.9
6	65.6	19	64.2	Mar. 1	45.5	11	35.8	23	65.5	4	82.0	11	74.7	21	96.6
7	65.3	20	64.2	2	46.1	12	32.5	24	65.5	5	82.0	12	74.7	22	96.6
8	65.7	21	64.2	3	45.1	13	32.5	25	67.2	6	76.2	13	91.3	23	99.4
9	65.7	22	64.2	4	44.4	14	34.0	26	68.4	7	76.2	14	83.0	24	99.4
10	66.9	23	64.2	5	47.6	15	32.8	27	79.0	8	67.3	15	89.3	25	99.4
11	63.3	24	60.7	6	47.6	16	32.8	28	79.0	9	67.3	16	89.3	26	99.4

El Paso Station

Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C	Date	Ka10 ⁵ @25°C
Jan. 1	193	Feb. 11	92.0	Mar. 24	113	May 4	79.2	June 15	78.5	July 26	83.3	Sept. 6	80.5	Oct. 17	113
2	185	12	93.5	25	106	5	78.7	16	77.2	27	78.9	7	80.5	18	113
3	189	13	94.4	26	103	6	75.3	17	76.2	28	80.1	8	81.6	19	125
4	200	14	94.5	27	103	7	78.4	18	78.8	29	81.4	9	85.8	20	142
5	198	15	96.6	28	104	8	77.7	19	77.4	30	84.4	10	84.8	21	149
6	196	16	96.4	29	97.6	9	78.5	20	78.3	1	85.8	11	84.8	22	158
7	196	17	93.5	30	97.2	10	78.1	21	77.0	2	90.1	12	81.7	23	167
8	193	18	96.5	31	100	11	76.5	22	77.3	3	87.1	13	89.5	24	177
9	186	19	96.9	Apr. 1	105	12	77.3	23	77.8	4	85.4	14	73.3	25	176
10	184	20	97.5	2	102	13	76.1	24	77.0	5	83.9	15	76.0	26	178
11	195	21	97.4	3	99.3	14	75.7	25	76.6	6	89.9	16	80.5	27	179
12	188	22	98	4	105	15	75.7	26	75.2	7	94.7	17	83.4	28	179
13	196	23	105	5	101	16	76.6	27	76.4	8	79.6	18	80.8	29	181
14	193	24	106	6	101	17	75.7	28	77.1	9	96.0	19	79.5	30	184
15	199	25	109	7	98.7	18	75.4	29	74.4	10	94.0	20	84.3	1	190
16	196	26	108	8	96.4	19	75.8	30	77.9	11	96.1	21	83.0	2	192
17	193	27	105	9	99.3	20	75.6	1	74.5	12	82.5	22	80.1	3	194
18	191	28	101	10	110	21	75.2	2	81.0	13	87.1	23	81.0	4	195
19	192	Mar. 1	111	11	117	22	75.4	3	77.0	14	90.6	24	79.9	5	197
20	195	2	90.8	12	104	23	76.7	4	75.3	15	96.0	25	79.1	6	197
21	199	3	96.6	13	102	24	76.7	5	86.0	16	85.3	26	78.2	7	197
22	190	4	96.6	14	104	25	76.6	6	81.3	17	86.0	27	81.7	8	198
23	187	5	96.4	15	99.3	26	78.8	7	82.4	18	86.4	28	84.3	9	196
24	186	6	97.9	16	94.1	27	79.2	8	81.9	19	87.4	29	85.7	10	194
25	197	7	97.6	17	95.3	28	80.5	9	82.9	20	89.4	30	84.9	11	187
26	189	8	97.4	18	94.1	29	80.2	10	81.7	21	88.7	1	85.5	12	198
27	187	9	94.9	19	91.9	30	81.0	11	81.6	22	82.4	2	84.0	13	197
28	194	10	96.0	20	90.0	June 1	79.3	12	101	23	86.5	3	95.8	14	178
29	194	11	96.4	21	90.4	2	85.0	13	104	24	84.4	4	102	15	184
30	195	12	105	22	89.0	3	80.3	14	98.8	25	78.6	5	105	16	184
31	182	13	112	23	89.7	4	79.0	15	91.6	26	88.0	6	108	17	163
Feb. 1	189	14	101	24	82.5	5	80.1	16	90.4	27	80.4	7	109	18	171
2	188	15	101	25	86.1	6	79.7	17	94.1	28	80.5	8	105	19	177
3	185	16	98.5	26	79.3	7	77.4	18	94.4	29	82.0	9	111	20	194
4	172	17	103	27	79.1	8	78.6	19	85.5	30	76.5	10	107	21	195
5	189	18	103	28	80.6	9	73.9	20	80	1	81.6	11	109	22	199
6	96.8														

ELECTRICAL CONDUCTANCE OF WATER SAMPLES

1942

Rio Conchos near Ojinaga, Chihuahua

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Rio Conchos near Ojinaga, Chihuahua.

Pecos River Station

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Pecos River Station.

Eagle Pass Station

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Eagle Pass Station.

Rio Salado Station

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Rio Salado Station.

Rio San Juan Station

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Rio San Juan Station.

Rio Grande City Station

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Rio Grande City Station.

North Floodway Near Sebastian, Texas

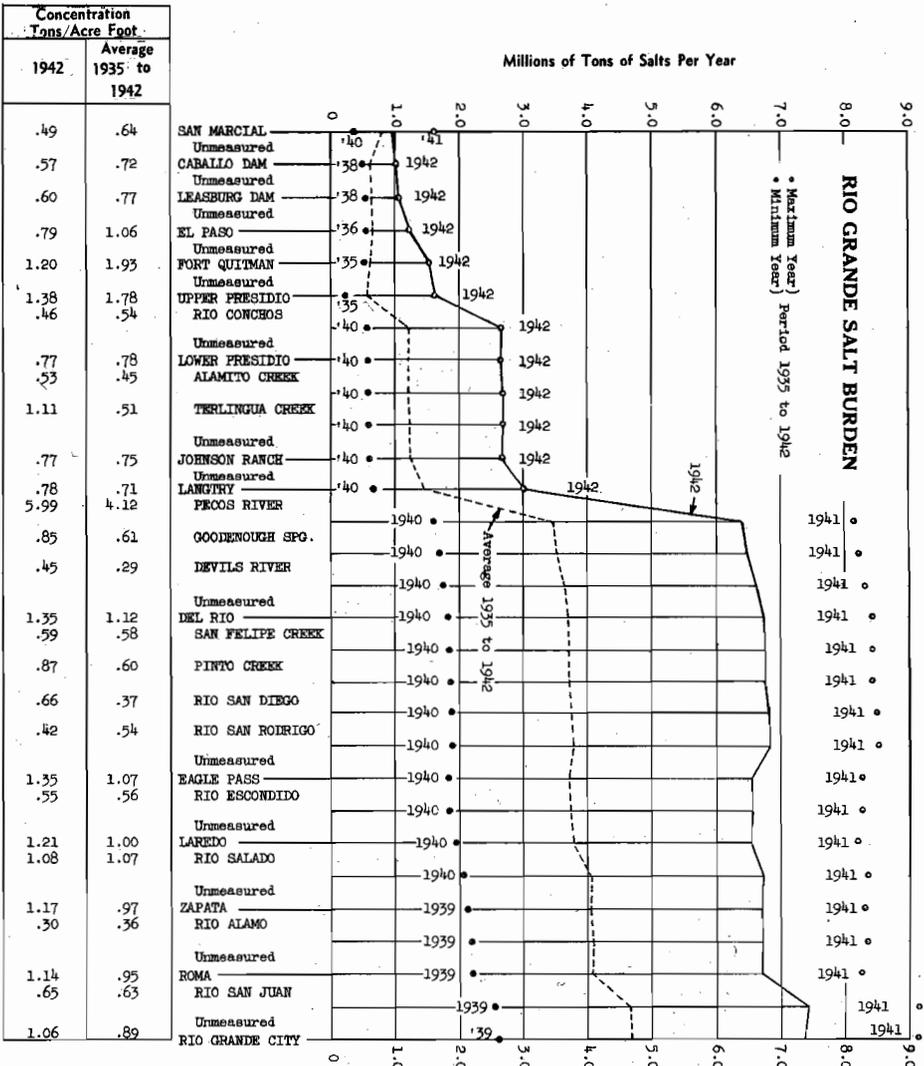
Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for North Floodway Near Sebastian, Texas.

Lower Brownsville Station

Table with columns: Date, K10^5 @25°C, Date, K10^5 @25°C. Data points for Lower Brownsville Station.

RIO GRANDE SALT BURDEN

The graphical and tabular results below are based upon the chemical analyses shown on the preceding pages as well as upon similar data in previous Water Bulletins. For some tributaries the results are based upon curves showing the relationship between salt concentration and amount of stream flow. For other stations and tributaries the results are arrived at by secondary deductions. For the total stretch of river between Eagle Pass and Rio Grande City an adjustment of 2.25% of Rio Grande City total tons was necessary to balance. This adjustment was prorated on a river mileage basis from Eagle Pass to Rio Grande City.



SALT INFLOW TO THE RIO GRANDE FROM THE PECOS RIVER

Line no. 1 below shows the cumulative departure from the monthly average* concentration of total dissolved solids (here called salts) in the water of the Pecos River at the gaging station near Comstock, Texas, as shown by the analyses of samples reported in these bulletins. This line shows a general downward, or below average, trend prior to June 1937, then a general upward, or above average, trend until the end of June 1938, then a more or less average general trend until June 1941, then a general upward trend to the end of 1942. These periods of pronounced upward trend, or abnormal concentration coincide with the periods of high storage content in Red Bluff Reservoir as shown by line No. 2 below, while the periods of average or below average trend correspond to the periods of no storage or low storage in the reservoir.

Similar data for the period 1935 to 1942 for (a) monthly acre feet discharge of the Pecos River near Comstock or at Orla; (b) monthly total tons of salts in the water near Comstock or at Orla; (c) monthly average concentrations of salts in the water at Orla; (d) monthly average rainfall on the Pecos watershed below Red Bluff Reservoir; these data show very slight or no correlation with the monthly concentration of salts in the water near Comstock.

For the above mentioned periods, when monthly concentration near Comstock was abnormal, Table 1 shows, by months, how many tons of salts, in excess of average,** passed in the water near Comstock and entered the Rio Grande.

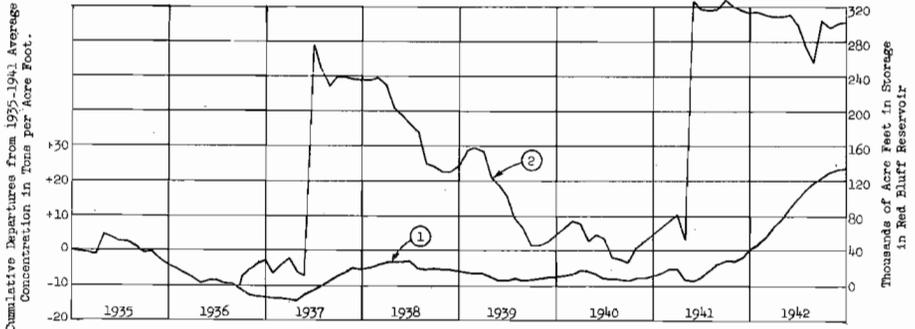


TABLE 1 TONS OF SALT BURDEN ENTERING RIO GRANDE FROM PECOS RIVER

Month and Year	Actual Salt Burden	Computed from average** concentration	Dif-ference	Month and Year	Actual Salt Burden	Computed from average** concentration	Dif-ference	Month and Year	Actual Salt Burden	Computed from average** concentration	Dif-ference
June 1937	247,373	140,038	107,335	June 1938	49,280	37,268	12,012	Jan. 1942	514,560	378,488	136,072
July "	79,565	43,368	36,197	Total "	590,560	501,448	89,112	Feb. "	421,770	290,318	131,452
Aug. "	74,931	45,791	29,140	June 1941	738,750	476,740	262,010	Mar. "	327,540	192,918	134,722
Sept. "	99,018	45,281	53,737	July "	438,496	196,088	242,408	Apr. "	196,010	118,494	77,516
Oct. "	129,522	91,072	38,450	Aug. "	229,824	128,304	101,520	May "	270,600	117,260	153,340
Nov. "	108,090	74,960	33,130	Sept. "	395,922	194,028	201,894	June "	196,300	83,490	112,810
Dec. "	112,262	109,983	2,279	Oct. "	1,788,480	1,647,540	140,940	July "	130,830	52,832	77,998
Total "	850,761	548,493	302,268	Nov. "	1,034,550	758,670	275,880	Aug. "	237,830	130,086	107,744
Jan. 1938	157,870	138,424	19,446	Dec. "	663,714	439,722	223,992	Sept. "	278,820	124,542	154,278
Feb. "	137,750	116,500	21,250	Totals "	5,289,736	3,841,092	1,448,644	Oct. "	246,010	168,822	77,188
Mar. "	105,830	90,060	15,770	Jan. 1939	289,736	178,480	111,256	Nov. "	302,300	213,081	89,219
Apr. "	76,900	65,376	11,524	Feb. "	137,750	116,500	21,250	Dec. "	266,590	240,397	26,193
May "	62,930	53,820	9,110	Mar. "	327,540	192,918	134,722	Totals "	3,389,260	2,110,728	1,278,532

* Monthly averages 1935 to 1941 inclusive.

** Monthly averages from all records 1930 to 1941 excluding the periods of abnormal concentration mentioned here.

There are long periods in the winter season when the flow of the Pecos River from Girvin to Comstock remains very uniform and when no storm run-off enters the river. For two such seasons chemical analyses are available for the Pecos flow at Girvin* and Sheffield* as well as at the Pecos River station near Comstock. Table 2 shows the amounts of water and of total salts passing each of the three stations and the net increase or decrease between stations. Combining both winter periods for a total of 265 days of uniform dry weather flow the table shows that over the 55 mile stretch from Girvin to Sheffield there was an average increase of 14.6 second feet in the river flow and an average decrease of 1.75 tons per acre foot in the concentration of salts in the water. Simultaneously from Sheffield to Comstock (117 miles) there was an average increase of 165.6 second feet in the river flow and an increase of .775 tons per acre foot in the concentration of salts in the water.

TABLE 2 INFLOW OF SALTS IN THE LOWER 117 MILES OF THE PECOS RIVER

Station	Within the Period	No. of Dry Weather Days	Discharge		Total Dissolved Solids			
			Acre Feet	Net Inflow between stations in second feet	Average Tons per Acre Feet	Total Tons	Net Inflow between stations	
							Tons	Average Tons per Acre Feet
Girvin	Nov. 9, 1939 - Apr. 30, 1940	145	23,358	12.9	15.26	356,357	-10,237	- 2.76
Sheffield	Nov. 11, 1939 - May 2, 1940	145	27,066	164.1	12.79	346,120	+46,179	.98
Comstock	Nov. 15, 1939 - May 6, 1940	145	74,273		5.28	392,299		
Girvin	Nov. 13, 1940 - Mar. 18, 1941	120	20,211	16.7	17.24	348,430	- 3,299	-.82
Sheffield	Nov. 15, 1940 - Mar. 20, 1941	120	24,187	167.3	14.27	345,171	+19,544	.49
Comstock	Nov. 19, 1940 - Mar. 24, 1941	120	64,010		5.70	364,715		
Girvin	Both periods combined	265	43,569	14.6	16.18	704,787		
Sheffield	" " "	265	51,253	165.6	13.49	691,291	-13,496	- 1.75
Comstock	" " "	265	138,283		5.47	757,014	+65,723	.775

* Girvin and Sheffield data by U. S. Geological Survey.

SANITARY ASPECTS OF WATER QUALITY

The sanitary water sampling and assay program began in 1941 and continued in 1942 with improved techniques. This is a joint undertaking of the Texas State Health Department, the Federal Department of Public Health of Mexico and the American and Mexican Sections of this Commission. Analyses of the samples were made in the El Paso City-County Health Laboratory, the laboratory at the Central Power and Light Company water plant at Loredo and a mobile laboratory of the State. All analyses conformed to "Standard Methods". Each sample was set up in lactose broth

in 4 dilutions in geometric series with 4 tubes of each dilution. The Most Probable Numbers of coliform organisms per 100 c.c. obtained from this setup by the Blakely method** are shown for 23 sampling points in the following table together with such data as were collected showing the biochemical oxygen demand (B.O.D.) and the percent saturation of dissolved oxygen (D.O.). These 9 natural figures were not corrected for elevation or dissolved chlorides.

Date 1942	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
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YULETAH RIVER DAM OUTLET

Oct. 16			* 0
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CARABALLO DAM OUTLET

Oct. 16			* 0
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MONTVIA DAM ABOVE EL PASO, TEXAS.

Date 1942	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
July 25	75.4	2.0	* 2,100
Aug. 5	75.1	2.0	4,500
Average	75.3	2.0	4,200

RIO GRANDE AT EL PASO STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
July 30	77.8	2.0	* 6,800
Aug. 1	76.4	1.8	* 3,300
4	76.4	2.0	* 3,900
6	76.4	1.6	* 3,900
8	72.7	2.0	* 3,900
11	75.0	1.6	* 11,000
13	70.3	1.8	* 7,300
15	77.4	2.0	* 18,000
18	72.0	2.4	* 14,000
20	77.4	1.0	* 6,900
22	75.0	1.0	* 2,300
25	68.0	1.0	* 11,000
27	71.0	1.0	* 5,600
29	75.9	1.0	* 3,600
Sept. 1	74.7	1.6	* 3,600
3	77.5	2.7	* 5,600
5	75.7	1.6	* 4,900
10	76.5	1.6	* 2,600
12	75.8	1.0	* 7,300
15	72.0	1.1	* 38,000
17	70.2	0.7	* 5,800
19	72.0	0.7	* 6,200
22	75.4	1.2	* 6,200
24	75.6	1.0	* 2,100
26	71.2	1.5	* 3,600
29	70.7	1.0	* 6,200
Oct. 6	80.7		* 2,300
13	67.0		* 6,500
20	68.0		* 6,200
27	67.8		* 6,200
Nov. 3	69.3		* 2,300
10	69.5		* 6,900
17	68.1		* 1,100
24	68.1		* 390
Dec. 2	70.4		* 1,100
8	64.7		* 2,300
15	66.4		* 390
26	68.7		* 390
Totals	2,757.3	41.4	220,130
Average	78.6	1.6	5,800

RIO GRANDE AT YULETAH-ZARAGOZA BRIDGE

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
July 30	66.8	3.1	* 360,000
Aug. 1	71.6	7.6	* 1,200,000
4	71.6	1.8	* 240,000
6	74.7	3.9	* 420,000
8	70.4	4.1	* 360,000
11	69.2	3.0	* 230,000
13	69.2	4.6	* 260,000
15	70.3	5.2	* 220,000
18	72.5	2.8	* 350,000
20	74.0	2.2	* 250,000
22	74.0	3.6	* 420,000
25	71.6	3.2	* 490,000
27	74.0	3.4	* 300,000
29	71.6	5.0	* 240,000
Sept. 1	75.7	3.0	* 240,000
3	72.6	2.6	* 1,400,000
5	71.3	1.7	* 140,000
10	69.5	1.4	* 160,000
12	68.4	2.5	* 260,000
15	72.7	1.4	* 230,000
17	66.9	1.4	* 80,000
19	73.6	1.9	* 120,000
22	69.0	1.0	* 130,000
24	72.5	1.4	* 360,000
26	68.0	1.6	* 54,000
29	70.6	1.0	* 110,000
Oct. 6	75.5		* 360,000
Nov. 3	73.7		* 360,000
17	68.9		* 7,000,000
24	40.2		* 1,100,000
Dec. 1	62.6		* 93,000
8	36.2		* 1,700,000
15	52.6		* 350,000
26	56.2		* 620,000
Totals	2,349.7	80.4	20,775,000
Average	67.1	3.1	590,000

* Presumptive test.

† Confirmed test.

‡ Average of tests in two laboratories.

** See Public Health Reports (Revised 1940) Reprint No. 1621.

Date 1942	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
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FABENS DAM NEAR FABENS, TEXAS.

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
July 26	74.9	2.5	* 1,000,000
Aug. 26	75.3	2.2	* 150,000
Sept. 2	76.4	2.4	* 36,000
9	73.0	0.8	* 68,000
16	71.2	1.0	* 110,000
23	75.9	1.8	* 160,000
30	73.8	1.0	* 36,000
Totals	522.5	11.5	4,134,000
Average	74.6	1.6	500,000

RIO GRANDE AT COURTY LINE STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Aug. 19	77.0	3.0	* 620,000
26	71.4	1.0	* 820,000
26	80.5	3.0	* 600,000
Sept. 2	77.2	2.6	* 230,000
9	78.8	2.6	* 150,000
16	68.9	1.2	* 360,000
23	75.6	2.2	* 230,000
30	75.8	2.2	* 60,000
Totals	501.6	19.0	2,920,000
Average	75.2	2.2	350,000

RIO GRANDE AT FORT QUINNAN STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
July 29	59.7	1.0	* 9,400
Aug. 12	75.5	0.6	* 62,000
19	72.4	2.0	* 23,000
26	81.3	1.4	* 1,100,000
Sept. 2	81.3	1.4	* 620,000
9	74.0	2.0	* 620,000
16	72.3	1.2	* 230,000
23	73.6	2.3	* 210,000
30	69.5	2.4	* 230,000
Oct. 15	71.3	1.0	* 250,000
22	76.9	0.7	* 23,000
29	80.4	0.6	* 36,000
Nov. 5	84.6	0.6	* 60,000
12	84.5	0.6	* 11,000
18	85.7	0.6	* 0
25	76.1	1.0	* 15,000
Dec. 2	80.6	0.6	* 1,600
9	78.9	0.6	* 6,200
16	78.2	0.6	* 29,000
Totals	1,472.5	15.7	3,983,000
Average	77.5	1.7	210,000

RIO GRANDE AT UPPER PRESIDIO STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Oct. 12	69.5	3.0	* 11,000
13	69.5	3.1	* 24,000
14	73.6	2.2	* 6,200
15	72.0	2.1	* 20,000
16	72.0	4.1	* 28,000
17	72.7	3.2	* 13,000
18	71.9	2.3	* 11,000
19	78.1	2.4	* 9,300
20	77.6	2.5	* 23,000
21	80.1	1.3	* 16,000
22	81.9	2.3	* 16,000
23	79.8	2.4	* 11,000
Totals	501.7	38.8	169,500
Average	75.1	2.7	16,200

RIO CONchos NEAR GITHAS, CHIL.

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Oct. 12	77.6	1.4	* 3,600
13	76.5	1.4	* 2,300
14	80.5	1.4	* 6,600
15	77.3	1.0	* 5,800
16	78.4	1.0	* 5,800
17	80.6	1.1	* 620
18	81.8	0.9	* 930
19	84.0	0.5	* 1,100
20	87.0	0.7	* 1,100
21	82.5	0.7	* 130
22	83.0	0.6	* 210
23	90.9	0.5	* 360
Totals	990.1	11.2	28,950
Average	82.5	0.5	2,400

RIO GRANDE AT LOWER PRESIDIO STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Oct. 12	73.0	1.7	* 11,000
13	75.2	1.6	* 24,000
14	76.1	2.0	* 11,000
15	75.0	1.9	* 24,000
16	76.1	2.0	* 13,000
17	82.5	1.6	* 6,200
18	79.6	1.3	* 6,200
19	80.7	1.5	* 5,000
20	84.7	1.5	* 16,000
21	85.1	1.0	* 16,000
22	82.0	1.0	* 1,600
23	87.2	1.1	* 2,100
Totals	961.2	18.0	136,100
Average	80.1	1.5	11,600

Date 1942	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
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WIO GRANDE AT LAUNDRY STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Nov. 16	79.8	0.7	* 130
25	83.7	0.5	* 93
Dec. 2	78.8	0.0	* 62
Totals	242.3	1.2	285
Average	80.8	0.4	95

FROGS RIVER NEAR ITS MOUTH

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Nov. 17	92.7	1.8	* 1,100
25	86.4	1.5	* 230
Dec. 2	75.9	0.0	* 210
4	94.0	1.7	* 210
Totals	348.0	5.0	1,750
Average	87.0	1.2	440

GOODENOUGH SPRING NEAR COMSTOCK, TEXAS.

Nov. 16	51.4	0	0
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DEVIS RIVER STATION NEAR DEL RIO, TEXAS.

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Nov. 17	103.3	1.5	* 620
Dec. 24	91.5	1.0	* 110
Average	97.4	1.2	360

ARROYO LAS VAGAS NEAR WILSA ACTVA, CHIL.

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Nov. 16	115.7	1.9	* 1,100,000
20	101.7	1.5	* 62,000
23	124.7	1.4	* 23,000
Dec. 1	122.2	2.6	* 6,200
5	90.0	2.8	* 3,600
15	92.0	2.0	* 11,000
Totals	522.3	12.2	1,205,800
Average	116.5	2.0	200,000

RIO GRANDE AT DEL RIO STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Nov. 16	97.8	1.9	* 53
20	93.8	1.2	* 93
23	89.0	1.0	* 62
Dec. 1	95.6	1.8	* 110
5	98.0	2.3	* 210
14	96.2	2.0	* 110
15	96.9	1.6	* 130
17	93.5	1.8	* 62
18	94.8	1.4	* 110
19	95.3	1.6	* 230
Totals	948.0	17.1	1,150
Average	94.8	1.7	120

SAN YLLEIS STATION NEAR DEL RIO, TEXAS.

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Nov. 16	85.1	0.4	* 210,000
23	87.2	0.6	* 110,000
23	102.5	0.9	* 5,400
Dec. 30	93.6	2.0	* 80,000
30	91.6	1.6	* 110,000
17	90.6	2.0	* 60,000
19			* 9,200
Totals	457.0	7.5	334,700
Average	91.4	1.2	76,000

RIO GRANDE AT RAGLE PASS STATION

Date	D. O. Percent Saturation	B. O. D. Parts Per Million	Coliform Organisms per 100 c. c.
Dec. 3			* 1,100
4			* 360
14			* 160
16			* 13
18			* 620
Totals			2,253
Average			

RAINFALL ON UNITED STATES SIDE OF RIO GRANDE WATERSHED INCHES—1942

The rainfall records shown below have not been published elsewhere. The source of each record, and the type of rain gage used, are shown below.

Latitude, longitude and elevation of each rainfall station will be found either in the index to rainfall stations in Water Bulletin No.10, or on page 71 of Water Bulletin No.11, or with the station record as published herein.

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																															
American Dam Near El Paso																																																																
Record by U.S. Section I.B.C.																																																																
Recording Gage																																																																
January		.09																																																														
February																																																																
March																																																																
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June																																																																
July		.09	.38	.18	.06																																																											
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October			.85																																																													
November																																																																
December						.77	.29																																																									
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Fort Bliss, Texas																																																																		
Record by U.S. Army																																																																		
Standard 5 inch rain gage																																																																		
January		.05																																																																
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August			.14																																																															
September																																																																		
October																																																																		
November																																																																		
December																																																																		
																															1942 Total	9.41																																		
																															Average 1940-1942	8.04																																		

Island Station																																																																		
Record by U.S. Section, I.B.C.																																																																		
Recording Gage																																																																		
January		.14																																																																
February																																																																		
March																																																																		
April																																																																		
May																																																																		
June																																																																		
July		.62																																																																
August																																																																		
September																																																																		
October																																																																		
November																																																																		
December																																																																		
																															1942 Total	7.93																																		
																															Average 1930-1942	7.52																																		

Fabens - Guadalupe Bridge, Texas																																																																		
Record by U.S. Section, I.B.C.																																																																		
Standard 5 inch rain gage																																																																		
January		.09																																																																
February																																																																		
March																																																																		
April																																																																		
May																																																																		
June																																																																		
July		.20																																																																
August			.56	.44																																																														
September																																																																		
October			.02	.04																																																														
November																																																																		
December																																																																		
																															1942 Total	10.4																																		

RAINFALL ON UNITED STATES SIDE OF RIO GRANDE WATERSHED

INCHES

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
-------	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-------	-------------------

S. T. Woods Ranch Record by Soil Conservation Service

Standard 6 inch rain gage																																1942 Total	1941-1942
Jan. 1942																																0	0
Feb. "																																0	0
Mar. "																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Lat. 29° 59'; Long. 104° 29'; Elev. 5,000 Feet																	# Period Average 1941-1942																

Bloya Camp Record by Soil Conservation Service

Standard 6 inch rain gage																																1942 Total	1941-1942
June "																																0	0
July 1941																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Jan. 1942																																0	0
Feb. "																																0	0
Mar. "																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Lat. 30° 31'; Long. 104° 07'; Elev. 5,000 Feet																	# Period Average 1941-1942																

Pete Kenedy Ranch Record by Soil Conservation Service

Recording Gage																																1942 Total	1941-1942
Mar. 1941																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Jan. 1942																																0	0
Feb. "																																0	0
Mar. "																																0	0
Lat. 30° 26'; Long. 104° 51'; Elev. 4,180 Feet																	# Period Average 1941-1942																

Townsend Ranch Record by Soil Conservation Service

Standard 6 inch rain gage																																1942 Total	1941-1942
Mar. 1941																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Jan. 1942																																0	0
Feb. "																																0	0
Mar. "																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Lat. 30° 16'; Long. 104° 10'; Elev. 4,580 Feet																	# Period Average 1941-1942																

H. B. Holmes Record by Soil Conservation Service

Standard 6 inch rain gage																																1942 Total	1941-1942
Mar. 1941																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Jan. 1942																																0	0
Feb. "																																0	0
Mar. "																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Lat. 30° 16'; Long. 104° 05'; Elev. 4,650 Feet																	# Period Average 1941-1942																

W. B. Mitchell's Sons Ranch Record by Soil Conservation Service

Standard 6 inch rain gage																																1942 Total	1941-1942
July 1941																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Jan. 1942																																0	0
Feb. "																																0	0
Mar. "																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Lat. 30° 16'; Long. 104° 05'; Elev. 4,650 Feet																	# Period Average 1941-1942																

Kerr Mitchell Ranch Record by Soil Conservation Service

Standard 6 inch rain gage																																1942 Total	1941-1942
Mar. 1941																																0	0
Apr. "																																0	0
May "																																0	0
June "																																0	0
July "																																0	0
Aug. "																																0	0
Sept. "																																0	0
Oct. "																																0	0
Nov. "																																0	0
Dec. "																																0	0
Lat. 30° 16'; Long. 104° 05'; Elev. 4,650 Feet																	# Period Average 1941-1942																

Some months missing

AVERAGE RAINFALL ON THE RIO GRANDE WATERSHED — INCHES

The first record below represents the average monthly rainfall over the entire Rio Grande watershed in the United States and in Mexico extending from the El Paso to the Fort Quitman gaging station on the Rio Grande. The second record similarly covers the entire watershed from Fort Quitman to Upper Presidio. These two records were computed from monthly isohyetal maps covering 7 years ending Oct. 1942, and multiple weightings of earlier pertinent station records. From Fort Quitman to Upper Presidio these maps show that the average annual rainfall on the valley floor (total 50,100 acres) was 92.9% of the general watershed average and that on the upland (total 1,876,300 acres) was 100.19% of the general watershed average.

The third record below covers the Lower Rio Grande Valley below Rio Grande City on the United States side and lying within the outer limits of present irrigation districts or farmed areas. The graphs on pages 79 and 80 of Water Bulletin No. 10 were based on this record.

El Paso to Fort Quitman

Fort Quitman to Upper Presidio

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows include years from 1870 to 1942 and a Total row.

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows include years from 1870 to 1942 and a Total row.

United States Side Below Rio Grande City

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows include years from 1871 to 1942 and a Total row.

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Total. Rows include years from 1899 to 1942 and a Total row.

1870 values not included in Totals and Normals

RAINFALL ON MEXICAN SIDE OF RIO GRANDE WATERSHED

INCHES—1942

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Hormiguero, Chih.													
1923	.11	.61	.79	0	0	0	0	0	0	0	0	0	28.73
1924	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1925	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1926	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1927	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1928	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1929	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1930	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1931	.39	.12	0	0	0	0	0	0	0	0	0	0	0
1932	.39	.12	0	0	0	0	0	0	0	0	0	0	0
Normal	.55	.31	.16	.14	.54	2.03	5.39	6.34	5.32	1.85	.65	.79	24.13

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Delicias, Chih.													
1923	.61	.31	0	0	0	0	0	0	0	0	0	0	11.53
1924	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1925	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1926	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1927	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1928	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1929	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1930	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1931	.61	.31	0	0	0	0	0	0	0	0	0	0	0
1932	.61	.31	0	0	0	0	0	0	0	0	0	0	0
Normal	.77	.20	.16	.21	.52	1.50	2.36	2.26	2.27	.82	.41	.41	11.91

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Chihuahua, Chih.													
1927	.04	.08	.50	.30	.43	.50	5.62	1.26	4.38	1.18	.04	.88	13.51
1928	.04	.08	.50	.30	.43	.50	5.62	1.26	4.38	1.18	.04	.88	13.51
1929	.04	.08	.50	.30	.43	.50	5.62	1.26	4.38	1.18	.04	.88	13.51
1930	.04	.08	.50	.30	.43	.50	5.62	1.26	4.38	1.18	.04	.88	13.51
1931	.04	.08	.50	.30	.43	.50	5.62	1.26	4.38	1.18	.04	.88	13.51
1932	.04	.08	.50	.30	.43	.50	5.62	1.26	4.38	1.18	.04	.88	13.51
Normal	.07	.05	.07	.16	.32	1.95	5.25	3.04	3.35	.94	.56	.39	15.39

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
El Mulo, Chih.													
1929	0	0	0	0	0	0	0	0	0	0	0	0	0
1930	0	0	0	0	0	0	0	0	0	0	0	0	0
1931	0	0	0	0	0	0	0	0	0	0	0	0	0
1932	0	0	0	0	0	0	0	0	0	0	0	0	0
Normal	.21	.07	.12	.34	.79	1.14	1.63	2.05	1.45	.95	.32	.78	10.23

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Sabinas, Coah.													
1927	.18	4.06	2.02	2.43	2.44	3.16	.99	6.61	6.11	.74	.86	0	31.02
1928	.18	4.06	2.02	2.43	2.44	3.16	.99	6.61	6.11	.74	.86	0	31.02
1929	.18	4.06	2.02	2.43	2.44	3.16	.99	6.61	6.11	.74	.86	0	31.02
1930	.18	4.06	2.02	2.43	2.44	3.16	.99	6.61	6.11	.74	.86	0	31.02
1931	.18	4.06	2.02	2.43	2.44	3.16	.99	6.61	6.11	.74	.86	0	31.02
1932	.18	4.06	2.02	2.43	2.44	3.16	.99	6.61	6.11	.74	.86	0	31.02
Normal	2.36	7	3.25	2.24	3.70	.99	.55	1.81	5.80	.47	.94	0	31.07
1941	2.36	7	3.25	2.24	3.70	.99	.55	1.81	5.80	.47	.94	0	31.07
1942	2.36	7	3.25	2.24	3.70	.99	.55	1.81	5.80	.47	.94	0	31.07
Normal	1.10	1.08	1.20	1.68	3.59	2.43	1.83	1.90	4.62	.71	.77	.76	22.53

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Saltillo, Coah.													
1886	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1887	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1888	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1889	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1890	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1891	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1892	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1893	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1894	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1895	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1896	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1897	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1898	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1899	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1900	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1901	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1902	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1903	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1904	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1905	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1906	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1907	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1908	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1909	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1910	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1911	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1912	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1913	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1914	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1915	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1916	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1917	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1918	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1919	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1920	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1921	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1922	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1923	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1924	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1925	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1926	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1927	.39	1.63	.85	.06	1.22	5.43	4.34	1.41	5.21	.65	0	.04	21.37
1928	.39	1.63	.85	.06	1.22	5.43	4						

EVAPORATION FROM FREE WATER SURFACES IN THE RIO GRANDE BASIN

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

1. Circular lead pan 4 feet in diameter and 10 inches deep, made of 20 gage galvanized iron, set on wooden platform on top of ground. Meter in pan kept at about 7 to 8 inches deep. Measurements by micrometer hook gauge. This type of pan was used in Jornada, Elephant Butte, Caballo Dam, State College, Alamo, Red Bluff Dam, Balcones (Weather Bureau), Grand Falls, Fort Stockton, Dilley and all Mexican stations. This is the standard Weather Bureau pan. First to Nov. 1935 a floating pan, described in previous bulletins, was used at Jornada.

2. Circular lead pan 6 feet in diameter and 2 feet deep, made of 20 gage galvanized iron, set with top of pan 4 inches above ground. Water in pan kept at about 15 to 18 inches deep. Measurements by micrometer hook gauge. This type of pan was used at Balcones (A. & M. College) and Mexico.

3. Circular lead pan 10 feet in diameter and 22 inches deep, set with the top edge of the pan about 1.5 inches above ground. Water in pan kept about 17 inches deep. Measurements by micrometer hook gauge. This type of pan is used at Winterhaven.

An evaporator developed by the United States Section of the International Boundary Commission and calibrated against a standard Weather Bureau pan, was used at San Marcial, N. M., Ysleta, Tiajuana, County Line, Fort Quitman, Pecos, Trinidad, Johnson Ranch, Devils River, Regia Pecos, and Rio Grande City, Texas.

The United States Weather Bureau furnished the records for 1. Elephant Butte, Caballo Dam, Jornada, State College, New Mexico; Alamo, Red Bluff Dam, Balcones, Grand Falls, Fort Stockton, Pecos, Texas A. & M. College case records of Balcones, Winterhaven and Mexico. The Mexican records are from the Meteorological Service of Mexico and the National Irrigation Commission.

Table with 12 columns: Station, Latitude, Longitude, Elevation, Station, Latitude, Longitude, Elevation, Station, Latitude, Longitude, Elevation, Station, Latitude, Longitude, Elevation. Lists various stations across the Rio Grande basin.

* 1916-1935 ** 1935-1942

In the United States

Table with 12 columns: Month, San Marcial, N. M., Elephant Butte Dam, N. M., Caballo Dam, N. M., Jornada, N. M., State College, N. M., Ysleta, Texas I. B. C., and Average 1935-42. Shows monthly evaporation data for various US stations.

Table with 12 columns: Month, Ysleta No. 13, Texas, Ysleta No. 16, Texas, Island Station, Texas, Fort Quitman, Texas, Pecos, Texas, Johnson Ranch, Texas, Alamo, N. M., Red Bluff Dam, Texas, and Average 1935-42. Shows monthly evaporation data for various US stations.

Table with 12 columns: Month, Balcones, Texas A. & M. College, Weather Bureau, Grand Falls, Texas, Fort Stockton, Texas, Devils River Bridge, Texas, Eagle, Texas, Winterhaven, Texas, Dilley, Texas, Rio Grande City, Texas, Weslaco, Texas, and Average 1935-42. Shows monthly evaporation data for various US stations.

In Mexico

Table with 12 columns: Month, La Janta, Chih., Villalba, Chih., La Boquilla Dam, Chih., Cd. Delicias, Chih., Palestina, Coah., Presa De Guadalupe, Coah., Sabinas, Coah., Don Martin, Coah., and Average 1935-42. Shows monthly evaporation data for various Mexican stations.

Table with 12 columns: Month, Lag De Salinas, Chih., Cd. Anahuac, N. L., Montemorelos, N. L., El Cedral, N. L., Cionaga De Flores, N. L., La Tabla, N. L., Santa Rosalia, Tamps., Comales, Tamps., Control (C. I. K. 9) and Average 1935-42. Shows monthly evaporation data for various Mexican stations.

† Some months missing. † Lag de Salinas, Chih. - 1941 should be 3.25. Sept. 1941 should be 7.05 † Sabinas, Coah. - Nov. 1941 should be 2.02 † Cd. Anahuac - May 1941 should be 7.97

MEAN MONTHLY TEMPERATURES ON RIO GRANDE WATERSHED EL PASO TO UPPER PRESIDIO Degrees Fahrenheit Above 40°

Between El Paso and Fort Quitman (T - 40°)

Between Fort Quitman and Upper Presidio (T - 40°)

The mean monthly temperatures listed below, expressed in degrees Fahrenheit above 40°, are the temperatures referred to as (T - 40°) in the equations above on page 60 of this bulletin. They were derived from recorded temperatures at El Paso, Fort and U.S. Weather Bureau.

The mean monthly temperatures listed below, expressed in degrees Fahrenheit above 40°, are the temperatures referred to as (T - 40°) in the equations above on page 60 of this bulletin. They were derived from recorded temperatures at Ft. Quitman, Ft. Quitman and Presidio kept by the U.S. Weather Bureau.

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Annual. Rows from 1889 to 1948.

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Annual. Rows from 1871 to 1948.

DEPARTURES FROM NORMAL WIND VELOCITY AT EL PASO, TEXAS

Miles per Hour

The original data indicate that each time the location of the Weather Bureau office was changed in El Paso the average wind velocity changed. Accordingly all mean monthly velocities were brought to the 1929-1935 base by multiplying them by the following period factors:

April 1888 to July 1894 1.239
Apr. 1894 to Dec. 189486188
May 1896 to Dec. 1896 1.12988

These adjusted velocities for the years 1889 to 1922 were then departed from the adjusted monthly normals for 1929 to 1935. The adjusted velocities for 1893 to 1934 and for 1935 to 1946 were likewise departed from their own respective normals. These adjusted normal velocities were:

Table with 13 columns: Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Year. Rows for Period 1900 through 1902, 1903 through 1904, and 1935 through 1942.

The following table of departures from normals was thus produced. All velocities are expressed in miles per hour.

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Annual. Rows from 1889 to 1948.

Table with 13 columns: Year, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec., Annual. Rows from 1901 to 1948.

DRAINAGE BASIN AND IRRIGATED AREAS Along the Rio Grande and Tributaries—1942

The drainage basin areas tabulated below are taken 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. But, in many places, and particularly along the southwestern side of the basin large areas yield no run-off to the Rio Grande. Such non-yielding areas constitute about 48.8% of the total area encompassed by the outer rim of the basin leaving 171,643 square miles of productive watershed. Only the productive watershed areas are listed below.

The irrigated areas listed hereunder include only areas below San Marcial gaging station on the Rio Grande and below Girvin gaging station on the Pecos River. These figures are from the most reliable sources and are the best figures available. On the United States side below Rio Grande City the figures are for cultivated acreages all of which have irrigation facilities, but a small part of which is farmed without irrigation in favorable seasons. (See page 58 hereof).

For drainage basin and irrigated areas in previous years see the heading of each gaging station in Water Bulletin Nos. 1 to 8, and see table in Water Bulletins No. 9, page 90, No. 10, page 102 and No. 11, page 81.

DESIGNATIONS OF AREAS AND GAGING STATIONS	Drainage Basin—Square Miles			Irrigated Areas—Acres			Total
	In		Total	In		Total	
	United States	Mexico		United States	Mexico		
				Primary	Secondary		
Above San Marcial Station	24,717	0	24,717				
San Marcial to Elephant Butte Dam	1,747	0	1,747	0	0	0	0
Above Elephant Butte Dam	26,464	0	26,464	0	0	0	0
Elephant Butte Dam to Caballo Dam	1,290	0	1,290	114	0	0	114
Above Caballo Dam	27,754	0	27,754	114	0	0	114
Caballo Dam to El Paso	1,513	0	1,513	97,710	0	0	97,710
Above El Paso Station	29,267	0	29,267	97,824	0	0	97,824
El Paso to American Dam	4	0	4	0	0	0	0
Above American Dam	29,271	0	29,271	97,824	0	0	97,824
American Dam to Juarez	41	47	88				
Above Juarez Station	29,312	47	29,359				
Juarez 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				
Guayuco Arroyo, above U. S. 80 Highway Bridge	162	0	162				
County Line to Ft. Quitman, excluding Guayuco Arroyo	501	679	1,180				
County Line to Ft. Quitman, including Guayuco Arroyo	663	679	1,342				
El Paso Station to Ft. Quitman Station - total	1,339	1,384	2,723	69,005	50,509	0	119,514
Above Ft. Quitman Station	30,606	1,384	31,990	166,829	50,509	0	217,338
Quitman Arroyo (I.B.C. name) above measuring point near its mouth	36	0	36				
Quitman Arroyo (I.B.C. name) above rocky canyon	18	0	18				
Red Light Arroyo (I.B.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				
Ft. Quitman to La Nutria, excluding Quitman Arroyo, Red Light Arroyo, and Van Horn Creek	628	886	1,514				
Ft. Quitman to La Nutria - total	1,041	886	1,927	1,899	5,440	0	7,339
Above La Nutria Station	31,647	2,270	33,917	168,728	55,949	0	224,677
Capote Creek, above measuring point near its mouth	93	0	93				
La Nutria to Upper Presidio - total	580	503	1,083	3,241	5,980	0	9,171
Above Upper Presidio Station	32,227	2,773	35,000	171,969	61,879	0	233,848
Rio Conchos, above Boquilla Dam	0	7,322	7,322		2,970	0	2,970
Rio Conchos, below Boquilla Dam, excluding area above Boquilla Dam	0	17,419	17,419	0	158,400	12,100	170,500
Rio Conchos - total	0	24,741	24,741	0	161,370	12,100	173,470
Upper to Lower Presidio, excluding Rio Conchos	21	5	26	1,650	0	0	1,650
Upper Presidio to Lower Presidio - total	21	24,746	24,767	1,650	161,370	12,100	173,120
Above Lower Presidio Station	32,248	27,519	59,767	173,619	223,249	12,100	408,968
Alamito Creek, above gaging station	1,504	0	1,504	805	0	0	805
Terlingua Creek, above gaging station	1,070	0	1,070	288	0	0	288
Lower Presidio to Johnson Ranch, excluding Alamito and Terlingua	1,439	2,671	4,110	2,376	1,730	0	4,306
Lower Presidio to Johnson Ranch - total	4,013	2,671	6,684	3,669	1,730	0	5,399
Above Johnson Ranch Station	36,261	30,190	66,451	177,288	224,979	12,100	414,367
Johnson Ranch to Boquillas	471	3,735	4,206	290	0	0	290
Above Boquillas Station	36,732	33,925	70,657	177,578	224,979	12,100	414,657
Maravillas Creek, above proposed gaging station	2,192	0	2,192	0	0	0	0
Lozier Creek, above gaging station	1,728	0	1,728	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	6,045	2,595	8,640	0	0	0	0
Johnson Ranch to Langtry, excluding Maravillas and Lozier	2,596	6,330	8,926				
Johnson Ranch to Langtry - total	6,516	6,330	12,846	290	0	0	290
Above Langtry Station	42,777	36,520	79,297	177,578	224,979	12,100	414,657

2. Estimated.

DRAINAGE BASIN AND IRRIGATED AREAS
Along the Rio Grande and Tributaries—1942

DESIGNATIONS OF AREAS AND GAGING STATIONS	Drainage Basin—Square Miles			Irrigated Areas—Acres			
	In		Total	In			Total
	United States	Mexico		United States	Mexico		
				Primary	Secondary		
Pecos River, above Girvin	29,562	0	29,562				
Pecos River, Girvin to I.B.C. gaging station	5,681	0	5,681	419	0	0	419
Pecos River, above I.B.C. gaging station	35,243	0	35,243	419	0	0	419
Goodenough Spring, above gaging station	1	0	1	0	0	0	0
Devils River, above Juno gaging station	2,733	0	2,733	0	0	0	0
Devils River, below gaging station near Juno to I.B.C. gaging station	1,327	0	1,327	0	0	0	0
Devils River, above I.B.C. gaging station	4,060	0	4,060	0	0	0	0
Cienegas Creek, above gaging station	18	0	18	3	0	0	3
Langtry to Del Rio, excluding above tributaries	398	2,495	2,893	0	0	0	0
Langtry to Del Rio - total	39,720	2,495	42,215	422	0	0	422
Above Del Rio Station	82,497	39,015	121,512	178,000	224,979	12,100	415,079
Las Vacas Arroyo, above gaging station	0	146	146	0	741	494	1,235
San Felipe Creek, above gaging station	62	0	62	725	0	0	725
Sycamore Creek, above gaging station	524	0	524	42	0	0	42
Pinto Creek, above gaging station	229	0	229	100	0	0	100
Rio San Diego, above gaging station	0	931	931	0	23,000	0	23,000
Las Moras Creek, above gaging station	162	0	162	736	0	0	736
Rio San Rodrigo, above gaging station	0	586	586	0	3,210	3,210	6,420
Del Rio to Eagle Pass, excluding above tributaries	527	581	1,108	15,647	7,660	0	23,307
Del Rio to Eagle Pass - total	1,504	2,244	3,748	17,250	34,611	3,704	55,565
Above Eagle Pass Station	84,001	41,259	125,260	195,250	259,590	15,804	470,644
Rio Escondido, above gaging station	0	1,130	1,130	0	6,080	8,650	14,830
Arroyo Amole - total	0	482	482	0	0	0	0
Eagle Pass to El Jardin, excluding above tributaries	736	1,191	1,927	1,326	247	0	1,573
Eagle Pass to El Jardin - total	736	2,803	3,539	1,326	6,427	8,650	16,403
Above El Jardin Dam Site	84,737	44,062	128,799	196,576	266,017	24,454	487,047
Santa Isabella Arroyo, above river road	350	0	350	0	0	0	0
El Jardin to Laredo, excluding Santa Isabella	387	1,079	1,466	4,186	1,240	0	5,426
El Jardin to Laredo - total	737	1,079	1,816	4,186	1,240	0	5,426
Eagle Pass to Laredo, excluding above tributaries	1,123	2,270	3,393	5,512	1,487	0	6,999
Eagle Pass to Laredo - total	1,473	3,882	5,355	5,512	7,667	8,650	21,829
Above Laredo Station	85,474	45,141	130,615	200,762	267,257	24,454	492,473
Dolores Creek, above gaging station	606	0	606	0	0	0	0
Rio Salado, above Don Martin Dam	0	13,819	13,819	0	54,400	8,900	63,300
Rio Salado, below Don Martin Dam	0	7,709	7,709	0	52,600	10,100	62,700
Rio Salado, above gaging station	0	21,528	21,528	0	107,000	19,000	126,000
Laredo to Zapata, excluding above tributaries	491	942	1,433	6,008	1,240	0	7,248
Laredo to Zapata, including Dolores and excluding Salado	1,097	942	2,039	6,008	1,240	0	7,248
Laredo to Zapata - total	1,097	22,470	23,567	6,008	108,240	19,000	133,248
Above Zapata Station	86,571	67,611	154,182	206,770	375,497	43,454	625,721
El Tigre Arroyo, above gaging station	261	0	261	0	0	0	0
Rio Alamo, above gaging station	0	1,675	1,675	0	4,940	5,440	10,380
Zapata to Roma, excluding above tributaries	771	315	1,086	1,102	0	0	1,102
Zapata to Roma, including El Tigre and excluding Alamo	1,032	315	1,347	1,102	0	0	1,102
Zapata to Roma - total	1,032	1,990	3,022	1,102	4,940	5,440	11,482
Above Roma Station	87,603	69,601	157,204	207,872	380,437	48,894	637,203
Rio San Juan, above gaging station at Santa Rosalia	0	12,013	12,013	0	102,500	67,200	169,700
Los Olmos Creek, above gaging station	535	0	535	0	0	0	0
Roma to Rio Grande City, excluding above tributaries	143	847	990	350	0	0	350
Roma to Rio Grande City, including Los Olmos and excluding San Juan	678	847	1,525	350	0	0	350
Roma to Rio Grande City - total	678	12,860	13,538	350	102,500	67,200	170,050
Above Rio Grande City Station	88,281	82,461	170,742	208,222	482,937	116,094	807,253
Rio Grande City to Hidalgo	415	430	845				
Above Hidalgo Station	88,696	82,891	171,587				
Hidalgo to Mercedes Bridge Station	15	15	30		14,300	0	
Above Mercedes Bridge Station	88,711	82,906	171,617		497,237	116,094	
Mercedes Bridge to Matamoros Station	11	11	22				
Above Matamoros Station	88,722	82,917	171,639				
Matamoros to Lower Brownsville Station	2	2	4				
Rio Grande City to Lower Brownsville Station	443	458	901	489,325	14,300	0	503,625
Above Lower Brownsville Station	88,724	82,919	171,643	697,547	497,237	116,094	1,310,878

* Cultivated acres, see heading on preceding page.

‡ Estimated.

‡ Estimated same as 1940.

IRRIGATED AREAS IN PAST YEARS

The acreages of land farmed by irrigation along the Rio Grande in the United States and in Mexico and on the Rio Conchos in Mexico, years, but they were carefully compiled from all known reliable information on the subject.

Acreage Irrigated Between El Paso and Fort Quitman				Acreage Irrigated Between Fort Quitman and Upper Presidio			
Year	U.S. Side	Mexican Side	Total	Year	U.S. Side	Mexican Side	Total
1880	14,800	24,700	39,500	1912	25,394	21,606	47,000
1881	15,000	24,700	39,700	1913	17,061	15,939	33,000
1882	15,200	24,700	39,900	1914	17,281	17,719	35,000
1883	15,400	24,700	40,100	1915	19,874	18,126	38,000
1884	15,600	24,700	40,300	1916	23,197	18,803	42,000
1885	15,800	24,700	40,500	1917	21,040	23,960	45,000
1886	16,000	24,700	40,700	1918	29,934	19,066	49,000
1887	16,200	24,700	40,900	1919	33,745	18,995	52,700
1888	16,400	24,700	41,100	1920	37,990	19,210	57,200
1889	16,600	24,700	41,300	1921	42,432	19,868	62,300
1890	16,800	24,700	41,500	1922	47,000	20,000	67,000
1891	17,000	24,700	41,700	1923	51,254	20,546	71,800
1892	17,200	24,700	41,900	1924	57,284	19,300	76,584
1893	17,400	24,700	42,100	1925	65,911	24,500	90,411
1894	17,600	24,700	42,300	1926	68,221	25,800	94,021
1895	17,800	24,700	42,500	1927	67,037	28,100	95,137
1896	18,000	24,700	42,700	1928	69,946	35,800	105,746
1897	13,500	17,700	31,200	1929	69,577	39,300	108,877
1898	9,000	10,700	19,700	1930	69,150	39,600	108,750
1899	4,826	3,374	8,200	1931	66,100	41,200	107,300
1900	5,867	4,133	10,000	1932	59,577	39,500	99,077
1901	7,040	4,960	12,000	1933	61,662	40,000	101,662
1902	3,520	2,480	6,000	1934	62,058	38,500	98,558
1903	4,694	3,306	8,000	1935	59,391	39,600	98,991
1904	294	206	500	1936	64,427	34,800	99,227
1905	5,280	3,720	9,000	1937	66,596	41,738	108,334
1906	7,040	4,960	12,000	1938	62,001	48,429	110,430
1907	8,537	5,963	14,500	1939	64,876	46,178	111,054
1908	15,392	10,608	26,000	1940	67,050	47,939	114,989
1909	23,308	16,692	40,000	1941	68,020	50,084	118,104
1910	29,324	18,676	48,000	1942	69,005	50,509	119,514
1911	25,362	19,638	45,000				
1912	25,394	21,606	47,000				
1913	17,061	15,939	33,000				
1914	17,281	17,719	35,000				
1915	19,874	18,126	38,000				
1916	23,197	18,803	42,000				
1917	21,040	23,960	45,000				
1918	29,934	19,066	49,000				
1919	33,745	18,995	52,700				
1920	37,990	19,210	57,200				
1921	42,432	19,868	62,300				
1922	47,000	20,000	67,000				
1923	51,254	20,546	71,800				
1924	57,284	19,300	76,584				
1925	65,911	24,500	90,411				
1926	68,221	25,800	94,021				
1927	67,037	28,100	95,137				
1928	69,946	35,800	105,746				
1929	69,577	39,300	108,877				
1930	69,150	39,600	108,750				
1931	66,100	41,200	107,300				
1932	59,577	39,500	99,077				
1933	61,662	40,000	101,662				
1934	62,058	38,500	98,558				
1935	59,391	39,600	98,991				
1936	64,427	34,800	99,227				
1937	66,596	41,738	108,334				
1938	62,001	48,429	110,430				
1939	64,876	46,178	111,054				
1940	67,050	47,939	114,989				
1941	68,020	50,084	118,104				
1942	69,005	50,509	119,514				
1873	400	600	1,000	1874	400	600	1,000
1874	400	600	1,000	1875	400	600	1,000
1875	400	600	1,000	1876	1,010	1,515	2,525
1876	1,010	1,515	2,525	1877	1,010	1,515	2,525
1877	1,010	1,515	2,525	1878	1,010	1,515	2,525
1878	1,010	1,515	2,525	1879	1,010	1,515	2,525
1879	1,010	1,515	2,525	1880	1,656	2,484	4,140
1880	1,656	2,484	4,140	1881	1,656	2,484	4,140
1881	1,656	2,484	4,140	1882	1,656	2,484	4,140
1882	1,656	2,484	4,140	1883	1,656	2,484	4,140
1883	1,656	2,484	4,140	1884	1,656	2,484	4,140
1884	1,656	2,484	4,140	1885	1,656	2,484	4,140
1885	1,656	2,484	4,140	1886	1,656	2,484	4,140
1886	1,656	2,484	4,140	1887	1,656	2,484	4,140
1887	1,656	2,484	4,140	1888	1,656	2,484	4,140
1888	1,656	2,484	4,140	1889	1,656	2,484	4,140
1889	1,656	2,484	4,140	1890	1,656	2,484	4,140
1890	1,656	2,484	4,140	1891	2,711	2,566	4,277
1891	2,711	2,566	4,277	1892	2,711	2,566	4,277
1892	2,711	2,566	4,277	1893	2,711	2,566	4,277
1893	2,711	2,566	4,277	1894	2,711	2,566	4,277
1894	2,711	2,566	4,277	1895	2,711	2,566	4,277
1895	2,711	2,566	4,277	1896	2,711	2,566	4,277
1896	2,711	2,566	4,277	1897	1,711	2,566	4,277
1897	1,711	2,566	4,277	1898	1,888	2,832	4,720
1898	1,888	2,832	4,720	1899	480	720	1,200
1899	480	720	1,200	1900	0	0	0
1900	0	0	0	1901	0	0	0
1901	0	0	0	1902	0	0	0
1902	0	0	0	1903	0	0	0
1903	0	0	0	1904	0	0	0
1904	0	0	0	1905	500	700	1,200
1905	500	700	1,200	1906	800	1,150	1,950
1906	800	1,150	1,950	1907	1,100	1,650	2,750
1907	1,100	1,650	2,750				
1908	2,800	3,600	6,400				
1909	2,750	3,500	6,250				
1910	1,750	3,050	4,800				
1911	1,750	3,050	4,800				
1912	2,225	3,100	5,325				
1913	2,250	3,600	5,850				
1914	2,225	3,100	5,325				
1915	2,500	3,200	5,700				
1916	2,550	3,300	5,850				
1917	2,950	3,500	6,450				
1918	3,250	3,600	6,850				
1919	3,450	4,000	7,450				
1920	3,600	4,300	7,900				
1921	3,600	5,000	8,600				
1922	4,005	3,500	7,505				
1923	4,350	6,700	11,050				
1924	4,705	6,223	10,928				
1925	5,480	6,173	11,653				
1926	6,300	8,273	14,573				
1927	7,545	8,123	15,668				
1928	7,800	8,173	15,973				
1929	7,700	8,673	16,373				
1930	7,550	9,684	17,234				
1931	7,425	10,684	18,109				
1932	6,700	11,674	18,374				
1933	4,719	11,599	16,318				
1934	10,965	10,965	21,930				
1935	4,496	10,555	15,051				
1936	4,576	11,245	15,821				
1937	4,844	11,025	15,871				
1938	5,335	10,681	16,016				
1939	4,359	12,435	16,794				
1940	5,043	12,334	17,377				
1941	5,374	12,334	17,708				
1942	5,240	12,283	17,523				

Acreage Irrigated on the Rio Conchos

Year	Watered Directly below La Boquilla	Rio San Pedro	Rio Florida		Rio Chiviscar	Delicias Project	Total La Boquilla to Rio Grande		Above La Boquilla	Total on Rio Conchos	
			Primary	Secondary			Primary	Secondary		Primary	Secondary
1900	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1901	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1902	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1903	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1904	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1905	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1906	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1907	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1908	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1909	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1910	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1911	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1912	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1913	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1914	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1915	19,820	12,360	13,340	6,030	3,900	49,420	6,030	2,940	52,360	6,030	
1916	22,540	12,360	14,930	7,750	4,820	54,150	6,750	2,940	57,090	7,510	
1917	25,110	12,360	16,610	7,510							

AUTHENTICATED DISCHARGE RECORDS

The tabulation below shows the publications in which may be found discharge records that have been authenticated by this Commission for gaging stations on the Rio Grande from San Marcial, New Mexico, to the Gulf of Mexico, and on tributaries near their confluence with the Rio Grande below San Marcial, as well as on floodways leading from the Rio Grande. For Lower Presidio and stations up stream the table covers all years of record including some carefully estimated records. For stations below El Paso the table covers only the years of record within the two periods, 1900 to 1913, and 1924 to 1942.

AUTHENTICATED DISCHARGE RECORDS					
Name of Gaging Station	Records Within The Period	Where Published	Name of Gaging Station	Records Within The Period	Where Published
San Marcial	1895*, 1896* - 1923	B. 7, 12*; P. 358, 388, 408, 438, 458, 478, 508, 528, 628.	Rio Conchos at La Boquilla	1896 - 1942	B. 12
	1924 - 1930	B. 6; P. 628, 668, 688, 703, 718.	Rio Conchos at Ojinaga	1896 - 1923	B. 7, 12
	1931 - 1932*	B. 1, 2, 6*; P. 718		1924 * 1926	B. 5, 6, 7*, 12*
	1933 - 1935* - 1942	B. 3 - 12*		1927 * 1932 - 1942	B. 5 - 7* - 12*
Below Elephant Butte Dam	1915* - 1916*	B. 10*, 12*; P. 458	Lower Presidio	1896 - 1900 ± 1913	B. 7*, 12
	1917 # 1937	B. 12. From original U. S. B. R. records		1914 - 1923*	B. 12*
	1938 - 1942	B. 8 - 12		1924 ± 1926 ± 1932	B. 1 - 4, 6*, 7*, 12*.
Below Caballo Dam	1938 - 1942	B. 8 - 12		1933 - 1937	B. 3 - 7
El Paso	1889* - 1893 * 1896	B. 7, 12*; P. 358	Alamito Creek	1932 - 1942	B. 8 - 10* - 12
	1897, 1898* - 1913	B. 7, 12*; P. 388, 408, 568, 588		1932 - 1937*	B. 2, 7 - 8*
	1914, 1915* - 1923	B. 6*; P. 588, 608, 628, 648, 668, 688, 703, 718	Terlingua Creek	1938*, 1939* - 1942	B. 8, 9, 10*, -12
	1924 - 1928* - 1930	B. 1 - 12	Johnson Ranch	Apr. 1936 - 1942	B. 6 - 12
Below American Dam	June 1938 - 1942	B. 8 - 12	Boquillas	1924 - 1928	B. 5, 6
	1936 - 1942	B. 8 - 12		1929 - 1930	B. 6; P. 688, 703, 718
El Paso Sewage Outfall	1936 - 1942	B. 8 - 12		1931 - Apr. 1936	B. 1 - 6
Cd. Juarez	Apr. 1938 - 1942	B. 8 - 12	Lozier Creek	1932 - 1935	B. 2 - 6
Island	Aug. 1938 - 1942	B. 8 - 12	Langtry	1900 ± 1913	B. 7*
Tornillo Bridge	1924 - 1930	B. 5, 6; P. 668, 688, 703, 718		1904* and 1906*	B. 9
	1931 - 1937	B. 1 - 7		1924* - 1927	B. 4*, 6
County Line	1938 - 1942	B. 8 - 12		1928 - 1930	B. 6; P. 668, 688, 703, 718
Near Fort Hancock	Apr. 1900 - June 1903	P. 358		1931 - 1942	B. 1 - 12
Ft. Quitman	1889 - 1922	B. 12	Pecos River	1900 - 1913	B. 7
	1923 - 1930	B. 6; P. 568, 588, 608, 628, 648, 668, 688, 703, 718		1924 - 1930	B. 6; P. 588, 608, 628, 648, 668, 688, 703, 718
La Nutria	1931 - 1942	B. 1 - 12	Goodenough Spring	1924 - 1930	B. 5, 6; P. 688, 703, 718
	1935 - 1941	B. 5 - 11		1931 - 1942	B. 1 - 12
Upper Presidio	1889-1900* 1913-1914	B. 7*, 12	Devils River	1900-1902* - 1913	B. 7, 11*
	1923 ± 1928	B. 4*, 6, 9*, 12*		1924 - 1930	B. 6; P. 588, 608, 628, 648, 668, 688, 703, 718
	1929 - 1930	B. 3, 6		1931 - 1932*	B. 1, 2, 5*, 6
	1931, 1932*, 1933*	B. 1 - 4*, 6, 8*, 9*		1933* - 1934*	B. 3, 4, 5*, 6
	1934 - 1937* - 1939*	B. 4 - 10*		1935 - 1936* - 1942	B. 5 - 10*, 12
1940 - 1942	B. 10, 11, 12				

B. - Water Bulletins of this Commission. * Partly revised in Water Bulletin marked thus*.

P. - Water Supply Paper of the U.S. Geological Survey. # Differs from records in Water Supply Papers.

AUTHENTICATED DISCHARGE RECORDS

AUTHENTICATED DISCHARGE RECORDS									
Name of Gaging Station	Records Within The Period		Where Published	Name of Gaging Station	Records Within The Period		Where Published		
Cienegas Creek	Sept. 1931	—	June 1935	B. 1 - 6	El Tigre	1932	Apr. 1936	B. 2 - 6	
Del Rio	1900	* 1913	B. 7*	Rio Aleme	1924	-	1942	B. 1 - 12	
		1924*	B. 4*, 6; P. 588, 608		Roma	1900	-	1913	B. 7
	1925	—	1930			1924	-	1929	B. 5, 6
	1931	—	1942	B. 1 - 12	Mar. 1929	-	1930	B. 6; P. 688, 703, 718	
Arroyo Las Vacas	June 1935	♀	Mar. 1938	B. 6 - 8	Rio San Juan	1931, 1932*	-	1942	B. 1 - 3* - 12
	Apr. 1938	—	Dec. 1942	B. 8 - 12		Oct. 1900	-	1913	B. 7
San Felipe Creek	Sept. 1931 - 1935*	-	1942	B. 1 - 10*, 12	1924 - 1932*	-	1942	B. 1 - 8* - 12	
Sycamore Creek	1932	—	May 1935	B. 2 - 6	Los Olmos Creek	1932	-	Mar. 1936	B. 2 - 6
	Pinto Creek	Nov. 1928	—	1930	B. 6; P. 688, 703, 718	Rio Grande City	1924 - 1932*	-	1936
		1931	—	1942	B. 1 - 12	1937 ± 1940	-	1942	B. 7 - 11*, 12
Rio San Diego	Oct. 1932	—	1942	B. 2 - 12	N. Floodway S. of McAllen	1926	-	1942	B. 2 - 5, 8 - 12
Las Moras Creek	1932 - 1934*	-	1935	B. 2 - 5*, 6	S. Floodway S. of McAllen	1926	-	1942	B. 2 - 5, 8 - 12
Rio San Rodrigo	1932	—	1937	B. 2 - 7	N. Floodway S. of Sebastin	Oct. 1940	-	1942	B. 10 - 12
	1938 ± 1941	-	1942	B. 8 - 12	Hidalgo	Aug. 1928	-	1930	B. 6; P. 668, 688, 703, 718
1900	* 1913	B. 7*	1931 - 1932	♀		1936	B. 1, 2 ½ 6		
1924	± 1926	B. 4*, 6		1938-1939, 1940		♀	1942	B. 8 - 10 ½ 12	
Eagle Pass	1927	—	1930	B. 6; P. 648, 668, 688, 703, 718	Retamal ☉	1939	-	1942	B. 9 - 12
	1931	—	1942	B. 1 - 12	Mercedes Bridge	1932, 1935	±	1936	B. 2, 5 [♀] , 6 [♂]
Rio Escondido	1932	—	1942	B. 2 - 12		1937, 1938	♀	1941	B. 7, 8 ½ 11
Laredo	1900	—	1913	B. 7		Rancho Viejo Floodway	1935	-	1942
	1924	* 1928	B. 4*, 5*, 6	Dolores Creek	1900	—	1913	B. 7	
	1929 - 1934*	-	1937		B. 1 - 7, 9*	1924	—	Sept. 1926	B. 6; P. 588, 608, 628
	1938	* 1940	B. 8 - 11*		1924	—	1926	B. 6; P. 588, 608, 628	
	1941	—	1942		B. 11, 12	Oct. 1926	-	1942	B. 1 - 12
	1932	—	May 1936	B. 2 - 6	Lower Brownsville	1934	-	1942	B. 4 - 12
Rio Salado	1900	—	1913	B. 7	Matamoros	1924	-	1926	B. 6; P. 588, 608, 628
	1924	—	1942	B. 1 - 12		Oct. 1926	-	1942	B. 1 - 12
Zapata	1932 - 1938*	-	1942	B. 2 - 10* - 12					

B. - Water Bulletins of this Commission. P. - Water Supply Papers of the U.S. Geological Survey.

* - Partly revised in Water Bulletins marked thus*.

♀ - Partial records. ☉ Retamal Canal is sometimes used as a floodway.