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WESTERN WATER BULLETIN 1969

Flow of
The Colorado River
and other
Western Boundary Streams
and
Related Data

COLORADO RIVER

TIJUANA RIVER

SANTA CRUZ RIVER

WHITEWATER DRAW

1969

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FOREWORD

This bulletin is the tenth annual compilation of stream discharges and other hydrographic data relating to the international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary. The compilation was prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission, solely for the purpose of presenting statistical data relating to stream flow and kindred subjects for the Colorado River from Imperial Dam to the Gulf of California, the Tijuana River and its important tributaries in the United States and Mexico, and other streams, including the Alamo and New Rivers which cross the California-Baja California boundary, and the Santa Cruz River and Whitewater Draw which cross the Arizona-Sonora boundary. This volume contains the information for the year 1969.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records have been obtained at this station since January 1878. Continuous stream gaging on the Tijuana River and its important tributaries in the United States and in Mexico began in 1936. Each government operates the gaging stations located within its own country.

Colorado River below Imperial Dam

Below Imperial Dam, the Colorado River flows southward 10 miles to the mouth of the Gila River, thence westward 11 miles to Pilot Knob Mountain, and south 1 mile to the point where the northerly international land boundary, between California and Baja California, intersects the river. From this point the river continues to flow southward and forms the boundary between the United States and Mexico for a distance of about 22 miles to the point where the southerly international land boundary between Arizona and Sonora intersects the river. From this point the river continues to flow southward about 90 miles to discharge into the Gulf of California.

The ordinary flows of Colorado River below Imperial Dam are largely controlled by releases at Hoover Dam, completed in 1935. The releases are further regulated at Davis Dam, completed in 1950, and by Parker and Imperial Dams, completed in 1938. Small amounts of runoff may occasionally be contributed to the flow in the lower river from the usually dry arroyos draining the 10,900 square miles along the river from Hoover Dam to the mouth of the Gila River, not including 5,500 square miles in the Bill Williams River watershed. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River and from the Gila River, draining about 7,300 square miles below Painted Rock Dam and Reservoir, completed in January 1960.

At Imperial Dam, diversions are made to Gila Gravity Main Canal and All-American Canal for irrigation projects in Arizona, including the Yuma Valley, Gila and Wellton-Mohawk projects, and in California, including the Imperial Valley, Coachella Valley and Reservation Division of Yuma Project. Also, under the provisions of the 1944 Water Treaty, there may be diverted to the All-American Canal at Imperial Dam for delivery to Mexico in the Alamo Canal, or substitute canal, at the northerly boundary, a portion of Mexico's guaranteed annual allotment of waters of the Colorado River. No such diversions were made in 1969.

Below Laguna Dam, measured and unmeasured flows are returned to the river principally as waste and drainage water from the irrigation projects in the United States. Waste and drainage waters from irrigation projects in the United States also cross the boundary into Mexico near San Luis, Arizona without returning to the river in the United States.

In the limitrophe section of the river, 1.1 miles downstream from the northerly boundary, Morelos Dam, the principal diversion structure for Mexico, was completed and placed in operation on November 8, 1950. Since that date all of Mexico's guaranteed treaty allotment of Colorado River water has been delivered in the limitrophe section of the river. The greater portion of such deliveries has been diverted to the Alamo Canal at Morelos Dam.

Tijuana River Basin

The total drainage area of the Tijuana River basin is 1,731 square miles of which 27 percent lies in the United States and 73 percent in Mexico. This river is formed by the principal tributaries, Cottonwood Creek, which rises in the United States and Río de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 21 miles from the Pacific Ocean to join the Río de las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 5 miles to cross the land boundary into the United States near San Ysidro, California, and Tijuana, Baja California, and then flows westerly 6 miles to discharge into the Pacific Ocean 2 miles north of the boundary. The flow of Cottonwood Creek is partially controlled by Barrett and Morena Reservoirs in the United States and the flow of the Río de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

Whitewater Draw near Douglas, Arizona

Whitewater Draw rises in the United States and flows south into Mexico crossing the international boundary near Douglas, Arizona, eventually discharging into the Gulf of California through the Yaqui River in Mexico. The total drainage area above the Douglas Gaging Station is 1,023 square miles. A number of mountain streams in the upper reaches of the basin are diverted for irrigation but they would normally sink or go to ground water before reaching the main water course.

San Pedro River at Palominas, Arizona

The San Pedro River rises in Mexico and flows north into the United States crossing the boundary near Palominas, Arizona, and thence northwesterly into the Gila River. The river in the vicinity of the international boundary drains an area of 741 square miles of which 649 square miles are in Mexico.

FOREWORD

Santa Cruz River near Nogales and Lochiel, Arizona

The Santa Cruz River rises in the United States and flows south into Mexico crossing the international boundary near Lochiel, Arizona, and returns to the United States near Nogales, Arizona, eventually discharging into the Gila River southwest of Phoenix, Arizona. The drainage area of the Santa Cruz River above Nogales station is 533 square miles. Of this amount, 349 square miles lie in Mexico. There are a few ground water irrigation diversions above the Lochiel station in Arizona and an unknown amount of water diverted for irrigation in Mexico.

Acknowledgments

Other agencies which have contributed to the data published herein include the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the U. S. Weather Bureau, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; and the Ministry of Hydraulic Resources of Mexico. Specific notation is made of each of the above-named agencies, where the data appear. The courtesy and cooperation of those who have made these contributions are acknowledged with appreciation.

Units of Measure

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

<u>METRIC UNITS</u>	<u>LENGTHS</u>	<u>ENGLISH UNITS</u>
1 Centimeter		0.393701 Inch
1 Meter		3.28084 Feet
1 Kilometer		0.621371 Mile
	<u>AREAS</u>	
1 Square Meter		10.76391 Square Feet
1 Hectare		2.471054 Acres
1 Square Kilometer		0.386102 Square Mile
	<u>VOLUME</u>	
1 Cubic Meter		61023.74 Cubic Inches
1 Cubic Meter		35.31467 Cubic Feet
1 Cubic Meter		1.30795 Cubic Yards
1000 Cubic Meters		0.81071 Acre-Foot
1 Liter		0.264172 U.S. Gallon
	<u>WEIGHTS</u>	
1 Kilogram		2.204623 Pounds
1 Metric Ton		2204.623 Pounds
1 Metric Ton		1.102311 Short Tons (2000 lbs.)

GENERAL HYDROLOGIC CONDITIONS FOR 1969

Colorado River

Normally, there is no measurable amount of runoff from the portion of the Colorado River basin in the United States and Mexico below Hoover Dam, not including Bill Williams and Gila Rivers. There was no significant amount in 1969. The average seasonal (October 1968-September 1969) rainfall over the upper basin, as gaged at 13 index stations, was about 15.40 inches compared to a seasonal average of about 13.80 inches for the 47 seasons (1923-1969). In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation (1969) measured at 6 index stations was 3.66 inches compared to an average of 2.20 inches during the last 11 years (1959 to 1969).

The flow of the Colorado River reaching Imperial Dam was 5,615,800 acre-feet, about 66% of the 35 year average (1935-1969) of 8,488,969 acre-feet. At the northerly international boundary the total flow of the river during 1969 was 1,319,855 acre-feet, about 33% of the 1935-1969 average of 4,004,223 acre-feet. At the southerly international boundary, the flow during 1969 was only 85,830 acre-feet, or about 3% of the 1935-1969 average of 3,217,458 acre-feet. The total flow of the Colorado River reaching the M. C. Rodríguez gaging station 24.5 miles downstream from the southerly international boundary, and 4.5 miles upstream from the Sonora-Baja California railroad bridge, was 37,491 acre-feet in 1969, about 3% of the 1951-1969 average of 1,378,257 acre-feet.

The total of all flows of the Colorado River entering Mexico in 1969 amounted to 1,565,784 acre-feet, 34% of the 1935-1969 average of 4,660,322 acre-feet, as measured 1) in the Colorado River at the northerly international boundary, 2) in the Wellton-Mohawk Main Outlet Drain Extension near Morelos Dam, 3) in the wasteways that discharge into the limitrophe section of the river from the United States bank, and 4) in the canal which discharges waste and drainage waters from the Yuma Project across the southerly land boundary into Mexico near San Luis, Arizona, less diversions in the United States by pumps in the limitrophe section.

No flood peaks of importance occurred in streams of the lower Colorado River basin during 1969. A maximum instantaneous flow of 4,040 second-feet occurred in the Colorado River at the northerly boundary station on April 9.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 18,817,900 acre-feet, 66% of the usable capacity of 28,588,400 acre-feet. The greater part (16,760,000 acre-feet) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 1969 due to drought or accident to the irrigation system.

The total reported acreage irrigated from waters of the Colorado River below Imperial Dam in 1969 was 1,090,496 acres; 660,586 acres in the United States and 429,927 acres in Mexico. An estimated one-third of acreage in Mexico is served by pumping from ground water.

The suspended sediment load passing the northerly boundary station in 1969 was 64.8 acre-feet, about 20% of the 1956-1969 average of 317.9 acre-feet.

Tijuana River Basin

During 1969, the temperatures of Barrett Dam, California (elevation 1,750 feet) in the upper portion of the basin in the United States averaged 61.4 degrees, 0.1 degree below the 39 year mean. In the extreme upper portion of the basin in Mexico at San Juan de Dios, Baja California (elevation 3,280 feet), the recorded temperatures during the year averaged 55.4 degrees, equal to the long-term average, and at Rodríguez Dam, Baja California (elevation 459 feet), the recorded temperatures averaged 64.4 degrees, 2 degrees above the 24-year normal.

At Barrett Dam in the upper portion of the basin in the United States, the recorded precipitation was 22.56 inches, 131% of normal, and at Chula Vista near the lower end of the basin, 9.21 inches, or 92% of normal. The recorded precipitation at San Juan de Dios in the upper portion of the basin in Mexico, was 16.8 inches, approximately 110% of the normal during the 14-year period, and at Rodríguez Dam in the lower portion of the basin in Mexico, 8.2 inches, 102% of the 32-year average.

Runoff in the basin during 1969 averaged less than 72% of normal. Above Morena Reservoir the runoff was 6,941 acre-feet, or about 111% of the 33-year 1937-1969 mean of 6,244 acre-feet. At Rodríguez Reservoir, the runoff was 8,059 acre-feet, or about 55% of the 32-year mean of 14,672 acre-feet.

The flow of the Tijuana River at the international boundary was 6,232 acre-feet during 1969, and the flow in the Tijuana River near Nestor was 3,754 acre-feet.

Whitewater Draw

During 1969, the average annual temperature over the watershed was slightly below normal, while the annual precipitation was above normal. Runoff for the year at the gaging station near Douglas, Arizona, of 3,897 acre-feet was about 55% of average.

GENERAL HYDROLOGIC CONDITIONS FOR 1969

San Pedro River

During 1969, the average annual temperature was below normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 82% of the 1961-1969 mean of 20.12 inches. The stream flow at the international boundary was 10,226 acre-feet, 47% of the 1951-1969 normal.

Santa Cruz River

During 1969, the average annual temperature over the watershed was somewhat below normal and the annual precipitation was about 111% of the 31-year 1939-1969 mean. Runoff measured at the Nogales gaging station where the stream re-enters the United States was 13,827 acre-feet. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States was 1,059 acre-feet. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 12,768 acre-feet from the loop of the river lying in Mexico, or approximately 92% of the flows reaching the Nogales station.

Alamo and New Rivers

During 1969, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, and at Mexicali, Baja California, was 72.5 and 71.6 degrees, respectively, 0.2 and 0 degrees below the respective normals.

At El Centro, the precipitation was 3.33 inches, about 130% of the 39-year average, and in Mexicali the annual precipitation was 3.46 inches, 114% of the 44-year average. The total flow of the New River at the international boundary in 1969 was 103,312 acre-feet which was about 143% of the 1943-1969 normal.

Salton Sea

During 1969, the average annual temperature around the Salton Sea was about 99% of the long-term average while the annual precipitation recorded at Brawley, California, was approximately 124% of the long-term mean of 2.36 inches. The water surface of the Salton Sea remained more or less the same during the year. The maximum stage 231.7 feet below mean sea level, was recorded on several days in March and April, 1969. The minimum stage, 232.9 feet below mean sea level, was recorded on October 18 to 24, inclusive.

COLORADO RIVER AT YUMA, ARIZONA - STAGES

DESCRIPTION: Water-stage recorder 200 feet upstream from lower highway bridge, 6.9 miles upstream from the northerly international land boundary, 2,100 feet downstream from the upper highway and railroad bridges at Yuma, Arizona, 4.7 miles downstream from the mouth of the Gila River, 19.1 miles downstream from Imperial Dam, and 0.3 mile upstream from the mouth of the Yuma Main Canal Wasteway. Zero of gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Mean daily gage heights are based on continuous water-stage records. Records available: Gage heights, January 1878 through August 10, 1965, furnished by the U. S. Geological Survey. From August 11, 1965 through 1969, records obtained by the United States Section of the Commission.

EXTREMES: Prior to 1935: Maximum gage height 136.79 feet on January 22, 1916; minimum gage height 115.49 feet on September 17, 1917. Since 1935: Maximum gage height 127.36 feet on September 7, 1939; minimum gage height 111.22 feet on July 16, 1947.

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	^u 113.03	113.07	113.13	113.36	113.55	113.15	113.12	113.29	113.14	112.81	112.96	112.81
2	^u 113.00	113.02	112.98	113.98	113.70	113.18	113.16	113.25	113.11	112.81	112.88	112.82
3	^u 112.96	113.01	113.06	113.63	113.88	113.13	113.14	113.23	113.10	* 112.82	112.74	112.83
4	^u 113.04	113.01	113.12	113.38	113.86	113.14	113.25	113.23	113.07	^u 112.86	113.06	112.90
5	^u 113.13	113.00	112.99	113.36	113.70	113.13	113.18	113.20	113.12	^u 112.82	112.86	112.89
6	^u 112.76	113.02	112.96	113.29	113.74	113.08	113.32	113.21	113.51	^u 112.85	112.93	112.84
7	^u 112.71	113.10	112.97	113.20	113.71	113.03	113.20	113.21	114.31	^u 112.82	112.93	112.92
8	* 112.74	113.10	113.00	113.26	113.68	113.07	113.22	113.23	114.13	* 112.84	112.92	113.30
9	112.73	113.10	113.00	113.90	113.68	113.18	113.27	113.28	113.75	112.89	112.94	113.80
10	112.97	112.90	112.99	113.97	* 113.58	113.28	113.19	113.25	113.38	112.86	113.91	113.64
11	112.93	112.96	113.10	113.33	^u 113.50	112.80	113.13	113.21	113.34	112.91	115.18	113.62
12	112.94	113.44	113.16	113.29	^u 113.46	* 112.95	113.14	113.20	113.23	112.86	115.03	112.97
13	112.93	113.47	112.99	113.25	^u 113.43	* 112.92	113.40	113.22	113.21	112.86	113.69	* 112.63
14	112.97	112.93	112.95	113.49	^u 113.40	^u 113.08	113.76	113.69	113.22	112.91	113.36	^u 113.48
15	113.18	113.29	112.90	113.78	^u 113.37	^u 113.18	114.26	113.67	113.21	112.90	113.69	^u 113.43
16	114.57	113.21	112.92	113.79	^u 113.30	^u 113.66	114.02	113.28	112.95	112.99	114.28	^u 113.37
17	113.98	113.21	112.92	113.50	^u 113.27	^u 113.62	113.73	113.20	112.97	113.01	113.99	^u 113.32
18	113.89	113.04	113.03	113.23	^u 113.26	* 113.59	113.69	113.27	112.99	113.01	113.70	^u 113.28
19	113.66	112.91	113.17	113.17	^u 113.28	113.68	113.54	113.28	112.96	112.94	113.46	* 112.22
20	113.34	112.92	113.14	113.13	^u 113.26	113.61	113.31	113.19	112.98	112.95	113.38	112.26
21	113.11	112.98	113.13	113.62	* 113.27	113.58	113.30	113.18	112.98	112.93	113.46	112.42
22	112.93	113.00	113.10	113.64	113.29	113.29	113.23	113.14	112.93	112.99	113.38	112.71
23	113.13	113.00	113.15	113.29	113.29	113.19	113.17	113.37	112.80	112.94	113.16	112.38
24	112.96	113.02	113.12	113.21	113.28	113.19	113.11	113.20	112.78	112.87	113.01	112.38
25	112.92	113.00	113.12	113.20	113.29	113.26	113.12	113.20	112.76	112.84	112.94	112.38
26	112.94	112.97	113.17	113.02	113.25	113.19	113.28	113.22	112.78	112.87	112.95	112.33
27	112.99	113.02	113.06	113.10	113.15	113.14	113.75	113.20	112.80	113.07	112.90	112.32
28	113.03	113.30	112.96	113.25	113.13	113.17	113.63	113.16	112.83	112.88	112.87	112.35
29	113.33		113.06	113.95	113.17	113.17	113.28	113.11	112.82	112.91	112.84	112.33
30	113.31		113.10	113.52	113.17	113.18	113.28	113.11	112.81	112.93	112.74	* 112.43
31	113.21		113.10		113.18		113.25	113.12		112.95		^u 112.55
Avg.	113.14	113.07	113.05	113.44	113.42	113.23	113.37	113.25	113.13	112.90	113.34	112.84

^u Estimated * Partly estimated

RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 500 feet upstream from the U. S. Highway No. 80 crossing and one mile northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gate. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 200 feet downstream from the spillway structure, and thence into the Colorado River on the right bank, 1,000 feet upstream from Colorado River below Yuma Main Canal Wasteway, and 6.5 miles upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on 26 current meter measurements during the year and a continuous record of gage heights. Records are computed and furnished by the U. S. Geological Survey. Records available: Monthly discharge, January 1913 to April 1920, October 1921 to March 1925, and January 1934 to September 1947; daily and monthly discharge, October 1947 through 1969.

REMARKS: Reservation Main Drain No. 4 collects drainage and wastewater from the area east of the Yuma Main Canal on the Reservation Division of the Yuma Project, located in California. Since 1939, collection of seepage from the All-American Canal has caused large increases in drainage flows. Average annual flow prior to 1937 was 12,800 acre-feet. Monthly and annual averages since 1937 are shown in the table below.

EXTREMES: Prior to 1937: Maximum annual flow 20,190 acre-feet, 1916; minimum annual flow 8,920 acre-feet, 1913.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	44	38	45	47	46	73	42	53	52	46	53	44
2	44	38	46	45	50	54	45	59	48	46	48	44
3	42	36	48	45	56	52	59	54	49	52	48	51
4	41	38	46	53	65	55	44	54	60	55	52	42
5	41	42	44	48	47	55	43	62	51	55	49	41
6	41	42	45	52	45	59	46	64	58	60	45	42
7	42	45	46	48	44	52	45	54	60	57	48	41
8	48	46	44	51	46	53	46	52	56	55	49	44
9	44	41	53	49	46	52	60	54	52	62	49	44
10	46	46	50	52	44	54	50	70	52	49	60	43
11	43	41	57	49	46	58	44	54	52	54	59	43
12	51	40	51	49	47	64	49	53	54	52	60	44
13	57	44	48	51	45	55	50	54	60	49	52	48
14	59	44	49	51	43	56	50	57	65	53	52	43
15	50	41	47	50	45	49	52	58	57	53	52	42
16	48	42	48	46	48	50	52	64	58	51	56	46
17	48	42	52	48	52	52	60	55	60	55	54	37
18	48	42	50	49	47	56	55	54	61	53	51	37
19	47	41	46	48	46	53	54	56	49	56	50	38
20	48	46	46	47	53	54	53	57	50	60	49	42
21	46	43	49	51	47	50	54	70	58	58	50	40
22	43	42	46	51	56	54	58	62	48	50	54	39
23	37	43	49	47	57	62	54	52	42	49	44	38
24	44	56	53	48	51	48	52	60	42	52	46	45
25	40	45	49	49	51	49	52	64	42	48	47	45
26	43	45	50	51	52	52	55	51	44	48	45	38
27	39	43	49	60	54	47	57	52	46	48	45	36
28	37	44	50	48	58	56	56	56	44	47	47	37
29	40		47	47	56	46	66	52	42	50	45	43
30	37		52	47	63	44	62	52	44	52	44	39
31	37		47		69		58	58		53		43
Sum	1,375	1,196	1,502	1,477	1,575	1,614	1,623	1,767	1,556	1,628	1,503	1,299

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1937-1969 Acre-Feet		
	High	Low	Day	High	Day	Low	Acre-Feet	Average	Maximum	Minimum	
Jan.			14	59	† 23	37	44.4	2,727	3,271	4,780	877
Feb.			24	56	3	36	42.7	2,372	3,115	4,320	563
Mar.			11	57	† 5	44	48.5	2,979	3,799	5,240	1,240
Apr.			27	60	† 2	45	49.2	2,930	3,825	5,250	1,160
May			31	69	14	43	50.8	3,124	3,930	5,590	992
June			1	73	30	44	53.8	3,201	3,822	5,580	885
July			29	66	1	42	52.4	3,219	4,120	6,550	816
Aug.			21	70	26	51	57.0	3,505	4,071	6,810	861
Sept.			14	65	† 23	42	51.9	3,086	3,844	6,220	889
Oct.			9	62	† 1	46	52.5	3,229	3,837	5,740	1,040
Nov.			10	60	† 23	47	50.1	2,981	3,575	5,490	994
Dec.			3	51	27	36	41.9	2,577	3,471	4,960	966
Yearly				73		36	49.6	35,929	44,680	63,700	12,840

Ø Mean daily † And other days

YUMA MAIN CANAL WASTEWAY TO COLORADO RIVER AT YUMA, ARIZONA

DESCRIPTION: The wasteway receives water from the Yuma Main Canal at the check structure on the canal, 1,645 feet upstream from the intake of the Colorado River siphon, and 3.2 miles downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 1,000 feet upstream from Colorado River below Yuma Main Canal Wasteway, and 6.5 miles upstream from the northerly international land boundary.

RECORDS: Discharge is computed as the difference between the measured discharge of the Yuma Main Canal at the Siphon Drop Power Plant upstream and that of the same canal below the Colorado River siphon, with deductions for small irrigation diversions from the canal between the two gaging stations. 1969 records good, except those below 100 second-foot, which are poor. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 1969.

REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal. This excess flow, in addition to the irrigation water, was diverted from the All-American Canal into the Yuma Main Canal and utilized for power purposes at the Siphon Drop Power Plant.

EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 297,800 acre-feet; maximum annual flow, 913,700 acre-feet, 1932; minimum annual flow, 114,900 acre-feet, 1917. Since 1935: Maximum mean daily discharge, 2,020 second-feet, December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	19	235	22	15	765	543	5.1	7.2	7.2	314	349	264
2	24	224	15	14	721	547	7.2	7.2	7.9	318	327	286
3	21	265	3.8	17	543	614	6.9	7.2	8.0	284	529	226
4	25	294	3.8	19	512	646	6.7	7.2	7.8	324	260	208
5	82	276	7.1	19	794	619	7.2	7.2	7.8	298	501	244
6	21	292	7.7	11	828	567	7.6	8.3	56	307	379	220
7	21	245	15	10	783	516	6.1	7.9	579	312	415	399
8	25	168	12	11	837	526	8.5	7.2	919	298	403	668
9	10	209	7.5	8.1	847	484	8.3	7.6	730	325	366	588
10	20	309	14	8.8	874	696	9.2	8.7	582	295	125	832
11	7.0	397	17	18	673	23	7.6	7.7	419	370	16	953
12	8.0	685	11	15	661	21	8.0	7.7	437	362	12	364
13	10	598	13	15	656	21	7.2	7.6	511	391	9.4	6.1
14	13	15	26	11	618	21	8.2	7.2	507	373	43	7.8
15	19	3.8	31	8.1	601	26	7.3	7.2	496	335	39	7.6
16	21	5.7	19	9.6	533	18	7.2	7.4	206	329	74	5.7
17	300	12	15	11	526	14	8.3	7.2	210	360	12	6.0
18	901	8.0	11	12	521	12	7.5	7.2	148	358	11	5.5
19	812	12	17	9.1	538	9.5	7.2	7.2	167	346	9.8	5.5
20	650	8.9	8.4	8.6	504	14	7.8	7.5	145	283	7.8	5.5
21	401	9.7	9.1	9.7	514	7.9	7.6	7.2	165	283	7.2	5.5
22	124	10	12	11	538	8.3	7.2	7.2	152	298	9.4	5.5
23	238	7.6	13	12	550	7.5	7.8	7.2	182	317	194	5.5
24	214	9.8	7.0	27	590	6.4	7.8	7.2	343	319	223	5.5
25	327	7.4	7.0	8.2	564	4.3	7.2	7.2	355	344	368	5.5
26	322	8.0	10	7.1	539	3.5	7.2	7.2	384	290	268	5.5
27	305	24	6.6	7.6	599	4.4	8.3	7.2	390	168	258	5.5
28	285	19	12	168	625	3.5	8.9	7.4	404	427	280	5.5
29	48	10	761	648	4.7	7.9	7.2	386	308	291	5.5	
30	37	14	702	650	4.3	7.4	7.6	354	391	338	5.5	
31	73	13	634	634	7.5	7.5	7.9	342	391	338	5.5	
Sum	5,383.0	4,358.9	396.0	1,959.9	19,793	5,992.3	233.9	230.1	9,265.7	10,069	6,124.6	5,362.2
Current Year 1969												
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1935-1969			
	High	Low	Day	High	Low	Day			Average	Maximum	Minimum	
Jan.			18	901	11	7.0	174	10,677	64,586	110,700	3,230	
Feb.			12	685	15	3.8	156	8,646	56,308	89,140	2,856	
Mar.			15	31	† 3	3.8	12.8	785	58,785	90,190	785	
Apr.			29	761	26	7.1	65.3	3,887	58,931	86,580	2,500	
May			10	874	20	504	638	39,259	65,756	88,280	5,480	
June			10	696	26	3.5	200	11,886	59,072	86,960	3,330	
July			10	9.2	1	5.1	7.5	464	58,965	91,220	464	
Aug.			10	8.7	† 1	7.2	7.4	456	59,291	89,890	456	
Sept.			8	919	1	7.2	309	18,378	58,880	83,660	12,419	
Oct.			28	427	27	168	325	19,972	56,877	90,050	2,176	
Nov.			3	529	21	7.2	210	12,148	57,254	101,500	3,850	
Dec.			11	953	† 18	5.5	172	10,636	64,515	108,800	918	
Yearly				953		3.5	190	137,194	721,020	1,042,850	75,950	

‡ Mean daily † And other days

COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY AT YUMA, ARIZONA - DISCHARGES

DESCRIPTION: Water-stage recorder located in California on the right bank of the river, 1,000 feet downstream from the mouth of the Yuma Main Canal Wasteway, 0.6 mile downstream from the abandoned gaging station on the Colorado River at Yuma, 5.2 miles downstream from the mouth of the Gila River, 19.6 miles downstream from Imperial Dam and 6.4 miles upstream from the northerly international boundary. Zero of gage is 101.99 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on 23 current meter measurements during the year, 12 by the U. S. Geological Survey, 11 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by U. S. Geological Survey. Records available: October 1963 through 1969. Records from January 1951 through September 1963, deduced from "Colorado River at Yuma" plus flows from "Reservation Main Drain No. 4", and "Yuma Main Canal Wasteway."

REMARKS: Reservoirs on the Colorado River, including Lake Mead where storage began in 1935, transmountain diversions, reservoirs on the Gila River, irrigation diversions and return flows modify the river flow at this station.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	498	687	631	696	1,240	1,010	657	695	540	644	719	575
2	485	674	562	1,080	1,330	1,020	627	674	531	660	678	585
3	471	688	584	860	1,370	1,010	621	658	538	648	734	575
4	515	710	608	714	1,370	1,030	668	651	530	662	696	568
5	570	685	552	711	1,370	1,020	627	629	540	638	748	607
6	402	714	548	676	1,400	971	709	650	796	657	706	575
7	388	723	535	623	1,370	916	638	631	1,790	643	721	694
8	401	698	550	645	1,360	923	659	631	1,750	658	712	1,020
9	403	709	535	1,020	1,380	951	682	656	1,390	678	687	1,280
10	513	676	525	1,100	1,310	1,130	647	659	1,090	641	1,200	1,300
11	480	734	575	723	1,170	539	607	619	976	720	2,180	1,340
12	480	1,140	624	686	1,130	576	617	611	927	687	2,000	749
13	487	1,120	553	664	1,130	542	738	613	958	697	815	387
14	513	536	549	775	1,080	579	959	899	962	737	660	375
15	702	667	530	941	1,080	636	1,330	889	941	719	850	359
16	1,560	643	525	953	1,020	910	1,220	641	651	727	1,350	355
17	1,280	646	527	806	1,020	887	1,020	583	650	760	1,080	335
18	1,470	576	563	646	1,010	895	937	614	611	772	836	331
19	1,290	524	614	610	1,040	921	818	615	596	731	721	312
20	1,040	524	603	593	1,020	902	681	575	598	692	649	343
21	811	535	601	841	1,040	854	688	583	612	677	683	375
22	572	548	592	877	1,050	696	657	564	586	710	689	422
23	715	544	609	694	1,050	649	623	665	546	704	662	367
24	639	567	599	688	1,060	642	595	592	618	701	627	359
25	678	550	591	642	1,060	676	591	591	629	681	672	359
26	683	537	615	569	1,050	640	681	587	655	669	629	339
27	688	562	558	600	1,010	612	1,010	578	666	687	596	335
28	687	677	513	721	1,020	629	934	560	679	751	599	351
29	697		543	1,510	1,050	629	687	535	670	706	592	339
30	695		562	1,200	1,050	634	680	545	639	740	589	371
31	678		571		1,050		685	555		726		367
Sum	21,491	18,594	17,647	23,864	35,690	24,029	23,293	19,548	23,665	21,523	25,080	16,649

Month	Current Year 1969						Period 1951-1969				
	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet		
	High	Low	Day	High		Minimum					
				Day	Low						
Jan.	11.64	9.75	16	1,670	9	375	693	42,627	265,895	979,890	37,156
Feb.	11.21	9.99	12	1,340	19	510	664	36,881	196,894	826,600	33,790
Mar.	10.36	9.96	1	707	28	495	569	35,002	216,195	1,073,270	35,002
Apr.	11.62	10.07	29	1,710	26	550	795	47,334	205,385	843,010	47,334
May	11.37	10.69	4	1,480	16	978	1,150	70,790	190,493	863,860	56,493
June	11.09	9.88	10	1,290	10	485	801	47,661	180,877	833,970	44,485
July	11.16	10.02	† 15	1,360	24	565	751	46,201	197,825	649,820	41,407
Aug	10.75	10.07	15	962	29	520	631	38,773	203,917	670,050	38,773
Sept.	11.87	9.91	7	1,910	24	467	789	46,939	168,422	775,930	43,182
Oct.	10.78	9.97	31	1,030	27	520	694	42,690	139,462	802,210	34,965
Nov.	12.17	9.85	12	2,280	5	458	836	49,745	166,315	911,370	36,924
Dec.	11.37	9.55	11	1,420	19	312	537	33,023	215,313	1,114,550	33,023
Yearly	12.17	9.55		2,280		312	743	537,666	2,346,993	10,220,870	537,666

† And other days

**COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY
AT YUMA, ARIZONA - STAGES**

(See Preceding Page For Description)

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.08	10.38	10.22	10.32	11.09	10.71	10.21	10.27	*	10.23	10.34	10.18
2	10.02	10.36	10.09	10.89	11.20	10.72	10.15	10.24	*	10.24	10.27	10.20
3	10.00	10.38	10.13	10.59	11.26	10.71	10.13	10.22	10.11	10.22	10.36	10.18
4	10.09	10.40	10.18	10.38	11.25	10.75	10.21	10.21	10.09	10.25	10.30	10.16
5	10.18	10.36	10.07	10.37	11.25	10.73	10.14	10.18	10.11	10.20	10.39	10.23
6	9.83	10.40	10.07	10.31	11.29	10.67	10.28	10.22	10.54	10.24	10.33	10.18
7	9.79	10.42	10.11	10.21	11.25	10.60	10.16	10.20	11.75	10.21	10.36	10.38
8	9.82	10.37	10.21	10.25	11.25	10.61	10.20	10.21	11.71	10.24	10.36	10.87
9	9.81	10.38	10.25	10.81	11.27	10.65	10.24	10.26	11.32	10.27	10.33	11.20
10	10.06	10.31	10.25	10.92	11.18	10.87	10.18	10.27	10.93	10.20	10.99	11.23
11	*	10.41	10.31	10.39	11.00	9.99	10.10	10.21	10.77	10.34	12.08	11.27
12	*	10.96	10.27	10.33	10.96	10.07	10.12	10.20	10.70	10.29	11.90	10.37
13	*	10.92	10.08	10.29	10.94	10.00	10.32	10.21	10.74	10.31	10.54	9.74
14	10.06	10.04	10.07	10.46	10.89	10.07	10.65	10.67	10.74	10.37	10.29	9.71
15	10.34	10.29	10.03	10.71	10.88	10.18	11.12	10.65	10.71	10.34	10.59	9.67
16	11.52	10.24	10.02	10.72	10.79	10.61	10.98	10.27	10.27	10.35	11.26	9.68
17	11.19	10.25	10.02	10.50	10.78	10.57	10.73	10.17	10.27	10.41	10.89	9.67
18	*	10.12	10.10	10.26	10.77	10.58	10.62	10.23	10.20	10.42	10.59	9.65
19	*	10.02	10.19	10.19	10.80	10.62	10.44	10.23	10.18	10.35	10.41	9.62
20	*	10.02	10.17	10.16	10.77	10.59	10.24	10.16	10.18	10.30	10.30	9.63
21	*	10.04	10.17	10.57	10.79	10.53	10.25	10.18	10.20	10.27	10.36	9.71
22	*	10.07	10.15	10.62	10.80	10.28	10.20	10.14	10.15	10.33	10.36	9.82
23	10.43	10.06	10.18	10.34	10.79	10.20	10.13	10.34	10.08	10.32	10.32	9.73
24	10.30	10.11	10.16	10.33	10.79	10.19	10.08	10.21	10.21	10.31	10.27	9.73
25	10.37	10.07	10.15	10.25	10.79	10.25	10.08	10.20	10.23	10.28	10.35	9.73
26	10.38	10.04	10.19	10.11	10.77	10.24	10.22	10.21	10.28	10.26	10.27	9.73
27	10.39	10.09	10.09	10.17	10.71	10.30	10.72	10.19	10.30	10.28	10.21	9.73
28	10.38	10.31	10.00	10.35	10.72	10.34	10.62	*	10.32	10.40	10.22	9.73
29	10.40		10.06	11.41	10.76	10.35	10.25	*	10.31	10.31	10.21	9.70
30	10.40		10.09	11.04	10.76	10.36	10.24	*	10.25	10.38	10.21	9.70
31	10.37		10.11		10.76		10.25			10.34		9.73
Avg.		10.28	10.14	10.48	10.95	10.44	10.33			10.30	10.52	10.00

* Recorder inoperative

DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 3.9 miles downstream from Colorado River below Yuma Main Canal Wasteway, and 2.5 miles upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."

RECORDS: Records are furnished by U. S. Geological Survey from 12 current meter measurements during the year. Records available: May 1948 through 1969.

REMARKS: Drain 8-B, which was constructed in February 1948, collects seepage water in the westerly section of the Reservation Division of the Yuma Project which lies in California. Flow in the drain between the mouth and the U. S. Highway No. 80 culvert, about 3,200 feet upstream, is affected by backwater from the river during ordinary high stages.

EXTREMES: Mean daily discharge: Maximum, 24 second-feet on September 1, 1953; minimum, 0.1 second-foot several days in February 1966.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.7	0.8	1.2	1.5	1.5	1.3	2.0	2.1	2.0	2.0	2.8	3.2
2	.7	.8	1.2	1.5	1.5	1.4	2.0	2.1	2.0	2.0	2.8	2.7
3	.7	.8	1.2	1.5	1.4	1.4	2.0	2.1	2.0	2.1	2.9	2.7
4	.7	.8	1.2	1.5	1.4	1.5	2.1	2.1	2.0	2.1	2.9	2.6
5	.7	.9	1.2	1.5	1.4	1.5	2.1	2.1	2.0	2.1	3.0	2.5
6	.7	.9	1.2	1.5	1.4	1.6	2.1	2.1	2.0	2.1	3.0	2.5
7	.7	.9	1.2	1.5	1.4	1.6	2.1	2.1	2.0	2.2	3.0	2.4
8	.7	.9	1.2	1.5	1.4	1.7	2.1	2.1	2.0	2.2	3.1	2.4
9	.7	.9	1.3	1.5	1.4	1.7	2.1	2.2	2.0	2.2	3.1	2.3
10	.7	.9	1.3	1.5	1.4	1.8	2.1	2.2	2.0	2.2	3.1	2.3
11	.7	.9	1.3	1.5	1.4	1.8	2.1	2.2	2.0	2.3	3.2	2.2
12	.7	.9	1.3	1.5	1.3	1.9	2.1	2.2	2.0	2.3	3.2	2.2
13	.8	1.0	1.3	1.5	1.3	1.9	2.1	2.2	2.0	2.3	3.2	2.2
14	.8	1.0	1.3	1.5	1.3	2.0	2.1	2.2	2.0	2.3	3.3	2.2
15	.8	1.0	1.3	1.5	1.3	2.0	2.1	2.2	2.0	2.4	3.3	2.2
16	.8	1.0	1.3	1.5	1.3	2.0	2.1	2.2	2.0	2.4	3.3	2.2
17	.8	1.0	1.3	1.5	1.3	2.0	2.1	2.2	2.0	2.4	3.4	2.1
18	.8	1.0	1.4	1.5	1.3	2.0	2.1	2.2	2.0	2.4	3.4	2.1
19	.8	1.0	1.4	1.5	1.3	2.0	2.1	2.2	2.0	2.4	3.4	2.1
20	.8	1.0	1.4	1.5	1.2	2.0	2.1	2.2	2.0	2.5	3.5	2.1
21	.8	1.0	1.4	1.5	1.2	2.0	2.1	2.2	2.0	2.5	3.5	2.1
22	.8	1.1	1.4	1.5	1.2	2.0	2.1	2.2	2.0	2.5	3.5	2.1
23	.8	1.1	1.4	1.5	1.2	2.0	2.1	2.2	2.0	2.5	3.6	2.1
24	.8	1.1	1.4	1.5	1.2	2.0	2.1	2.2	2.0	2.6	3.6	2.1
25	.8	1.1	1.4	1.5	1.2	2.0	2.1	2.2	2.0	2.6	3.6	2.0
26	.8	1.1	1.4	1.5	1.2	2.0	2.1	2.3	2.0	2.6	3.6	2.0
27	.8	1.1	1.5	1.5	1.2	2.0	2.1	2.3	2.0	2.6	3.6	2.0
28	.8	1.1	1.5	1.5	1.2	2.0	2.1	2.3	2.0	2.6	3.6	2.0
29	.8		1.5	1.5	1.2	2.0	2.1	2.3	2.0	2.6	3.6	2.0
30	.8		1.5	1.5	1.2	2.0	2.1	2.3	2.0	2.6	3.6	2.0
31	.8		1.5	1.5	1.2	2.0	2.1	2.3	2.0	2.6	3.6	2.0
Sum	23.6	27.1	41.4	45.0	40.4	55.1	64.8	68.0	60.0	73.2	98.7	69.6

Month	Extreme Gage Feet		Current Year 1969				Average Second Feet	Total Acre Feet	Period May 1948-1969		
	High	Low	Extreme Second Feet		Day	Acre Feet					
			Day	High		Low	Average	Maximum	Minimum		
Jan.			† 13	0.8	† 1	0.7	0.8	46.8	408	899	39.3
Feb.			† 22	1.1	† 1	.8	1.0	53.8	356	746	40.5
Mar.			† 27	1.5	† 1	1.2	1.3	82.1	432	853	73.8
Apr.				1.5		1.5	1.5	89.3	453	1,000	66.8
May			† 1	1.5	† 20	1.2	1.3	80.1	451	966	61.5
June			† 14	2.0	† 1	1.3	1.8	109	475	1,030	67.4
July			† 4	2.1	† 1	2.0	2.1	129	542	1,260	72.8
Aug.			† 26	2.3	† 1	2.1	2.2	135	599	1,350	73.8
Sept.				2.0		2.0	2.0	119	568	1,370	53.6
Oct.			† 24	2.6	† 1	2.0	2.4	145	576	1,220	55.3
Nov.			† 23	3.6	† 1	2.8	3.3	196	519	1,240	57.7
Dec.			† 1	3.2	† 25	2.0	2.2	138	473	1,050	51.0
Yearly				3.6		0.7	1.8	1,323	5,852	12,429	834

Ø Mean daily † And other days

PILOT KNOB POWER PLANT AND WASTEWAY NEAR PILOT KNOB, CALIFORNIA

DESCRIPTION: The Pilot Knob Power Plant and Wasteway is located on the All-American Canal, 20.8 miles downstream from the intake at Imperial Dam, 6 miles west of Yuma, about one mile north of the northerly international boundary and empties into the Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about one mile upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 550 feet upstream from wasteway gates and 1,800 feet from entrance to the power plant. Datum of gage is 150.00 feet above mean sea level. Tailrace gage is on left bank, 680 feet downstream from power plant with automatic recording equipment in control house. All bypass gates are equipped with calibrated openings which are read on all gate changes. Datum of tailrace gage is at mean sea level; elevation of sill of wasteway gates is 147.88 feet, U. S. C. & G. S. datum. Prior to October 1956, this station was published as "Pilot Knob Wasteway near Pilot Knob, California."

RECORDS: Daily discharge is computed from flowmeter equipment and head and openings on wasteway gates or from head and gate opening on wicket and wasteway gates. Records furnished by the U. S. Geological Survey, Records available: July 1944 through 1969. The wasteway was operated for the purpose of diverting Colorado River water to the Alamo Canal for use in Mexico from July 1944 to November 8, 1950, in accordance with arrangements between the United States and Mexico for emergency use of the All-American Canal facilities. Records since 1950 show water released through Pilot Knob Power Plant and Wasteway from the All-American Canal and returned to the Colorado River through Rockwood gates.

REMARKS: Pilot Knob Wasteway was completed in 1938 and the first flow occurred on February 5, 1939. Pilot Knob Power Plant was completed in January 1957 and the first flow occurred on January 14, 1957.

EXTREMES: Maximum mean daily discharge, 8,350 second-feet on January 26, 1958; minimum mean daily discharge, no flow during long periods.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,500	0	1,400	2,850	0	0	1,310	2,020	1,030	0	0	0
2	1,800	0	1,770	2,570	0	0	1,310	2,000	1,040	0	0	0
3	2,130	0	1,740	2,650	0	0	1,300	2,040	1,030	0	0	0
4	2,060	0	1,710	2,920	0	0	1,280	2,020	1,040	0	0	0
5	1,870	0	1,800	2,840	0	0	1,300	2,040	1,020	0	0	0
6	2,120	0	1,780	2,850	0	0	1,220	2,100	950	0	0	0
7	2,250	0	1,770	2,950	0	0	1,560	2,110	0	0	0	0
8	2,270	0	1,860	3,060	0	0	1,720	2,100	0	0	0	0
9	2,230	0	1,850	2,640	0	0	1,700	2,070	0	0	0	0
10	2,110	0	1,770	2,390	0	0	1,750	2,050	0	0	6	0
11	2,130	0	1,710	2,800	0	1,100	1,820	2,050	0	0	0	0
12	2,050	0	1,630	2,660	0	1,010	1,800	1,740	0	0	0	513
13	2,070	46	1,730	2,580	0	1,100	1,800	1,750	0	0	0	962
14	2,110	988	2,150	2,490	0	1,080	1,780	1,520	0	0	0	961
15	2,160	1,060	2,480	2,540	0	1,370	1,470	1,500	0	0	0	961
16	2,020	980	2,540	2,620	0	1,050	1,480	1,690	0	0	0	962
17	539	1,000	2,700	2,650	0	1,050	1,690	1,590	0	0	0	959
18	0	1,070	2,730	2,630	0	1,020	1,700	1,350	0	0	0	961
19	0	1,280	2,640	2,540	0	1,010	1,730	1,320	0	0	0	960
20	0	1,270	2,640	2,500	0	1,000	1,680	1,250	0	0	0	960
21	0	1,230	1,660	2,290	0	1,050	1,640	1,260	0	0	0	962
22	0	1,180	2,710	2,090	0	1,190	1,700	1,300	0	0	0	963
23	0	1,180	2,630	1,970	0	1,300	1,720	1,210	0	0	0	961
24	0	1,180	2,610	1,980	0	1,320	1,740	1,260	0	0	0	960
25	0	1,220	2,750	1,970	0	1,260	1,750	1,320	0	0	0	961
26	0	1,250	2,730	1,730	0	1,250	1,760	1,330	0	0	0	962
27	0	1,280	2,730	1,420	0	1,360	1,480	1,320	0	0	0	961
28	0	1,070	2,790	1,140	0	1,330	1,500	1,320	0	0	0	961
29	0	0	2,850	0	0	1,340	1,670	1,370	0	0	0	1,060
30	0	0	2,750	0	0	1,290	1,740	1,070	0	0	0	1,370
31	0	0	2,640	0	0	1,770	1,060	1,060	0	0	0	1,540
Sum	33,419	17,284	70,250	68,320	0	23,480	49,870	50,130	6,110	0	6	19,860

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High		Low			Average	Maximum	Minimum
				Day	Day						
Jan.			8	2,270	† 18	0	1,078	66,286	43,214	400,200	0
Feb.			† 19	1,280	† 1	0	617	34,282	17,505	149,500	0
Mar.			29	2,850	1	1,400	2,266	139,339	63,054	279,300	0
Apr.			8	3,060	† 29	0	2,277	135,511	92,358	260,900	0
May				0		0	0	0	21,316	165,400	0
June			15	1,370	† 1	0	783	46,572	64,836	204,300	0
July			11	1,820	6	1,220	1,609	98,916	114,704	260,000	0
Aug.			7	2,110	31	1,060	1,617	99,431	119,058	270,100	0
Sept.			† 2	1,040	† 7	0	204	12,119	60,313	173,300	0
Oct.				0		0	0	0	12,156	51,460	0
Nov.			10	6	† 1	0	.2	11.9	17,082	182,600	0
Dec.			31	1,540	† 1	0	667	39,392	35,202	319,700	0
Yearly				3,060		0	930	671,859.9	660,798	1,944,700	0

Ø Mean daily † And other days

**WELLTON-MOHAWK DRAINAGE WATER DISCHARGED TO COLORADO RIVER
ABOVE MORELOS DAM**

DESCRIPTION: Diversion structure (Main Outlet Drain Extension No. 1) in Wellton-Mohawk Drainage Extension Channel for diverting water to the Gila River, 0.5 mile upstream from the confluence of the Gila and Colorado Rivers. A continuous water-stage recorder immediately upstream from outlet structure (Main Outlet Drain Extension No. 2), 0.4 mile downstream from diversion structure which diverts water from the Extension Channel directly to the Colorado River at a point 0.8 mile upstream from the northerly international boundary, and 1.9 miles upstream from Morelos Dam. The Gila River enters the Colorado River 13 miles upstream from Morelos Dam.

RECORDS: Partial diversions of the Extension Channel flow at M. O. D. E. No. 1 were determined from the gage openings, rated by discharge measurements below the outlet. Diversions of the total Extension Channel flow were determined at an upstream measuring station at channel station 9+00. Flows diverted at M. O. D. E. No. 2 were based on 20 discharge measurements during the year and a continuous record of gage heights. Records furnished by Bureau of Reclamation through September 30, 1969. Beginning October 1, 1969 records furnished by U. S. Geological Survey. The record shown below is the combination of diversions at M. O. D. E. No. 1 and M. O. D. E. No. 2. Records available: February 10, 1961 through 1969.

REMARKS: Pursuant to Minute No. 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 12 miles, and placed in operation on November 16, 1965. Drainage flows may be discharged to the Gila River and thence to the Colorado River at the diversion structure, M. O. D. E. No. 1, at the upstream end of the extension; and directly to the Colorado River at the structure above Morelos Dam, M. O. D. E. No. 2, and at the structure immediately below Morelos Dam, M. O. D. E. No. 3, the record of which is shown on page 22.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	200	0	188	295	138	176	231	282	184	0	0	0
2	228	0	207	297	140	158	228	280	184	0	0	0
3	230	0	210	294	140	152	223	282	187	0	0	0
4	230	0	212	299	146	156	228	278	195	0	0	0
5	230	0	210	293	148	159	231	276	190	0	0	0
6	228	0	204	292	148	164	229	275	182	0	0	0
7	226	0	210	292	142	164	240	278	180	0	0	0
8	226	0	210	294	150	159	262	276	192	0	0	0
9	222	0	210	292	139	159	267	280	161	0	0	90
10	226	0	208	296	127	175	262	280	128	0	0	80
11	228	68	207	296	115	207	247	276	113	0	0	65
12	228	86	208	294	118	216	247	275	115	0	0	54
13	226	104	207	300	117	221	364	247	115	0	0	50
14	226	121	228	318	119	221	300	220	118	0	0	52
15	220	131	263	306	124	239	296	223	110	0	0	49
16	0	132	290	303	124	237	295	224	18	0	0	47
17	56	157	295	292	121	232	297	207	0	0	0	54
18	152	158	295	302	117	237	289	210	0	0	0	56
19	125	157	303	299	120	247	196	212	0	0	0	54
20	108	154	301	296	126	245	267	202	0	0	0	54
21	40	162	308	299	130	245	266	202	0	0	0	54
22	0	159	305	262	126	237	266	203	0	0	0	55
23	0	159	293	248	122	242	273	198	0	0	0	55
24	0	158	290	244	126	245	294	198	0	0	0	55
25	0	159	292	236	126	247	304	205	0	0	0	55
26	0	161	282	212	173	244	302	203	0	0	0	55
27	0	164	290	192	180	242	258	208	0	0	0	56
28	0	161	293	161	178	245	262	208	0	0	0	56
29	0	0	287	136	180	244	262	193	0	0	0	54
30	0	0	290	118	176	234	264	187	0	0	0	65
31	0	0	293	178	178	0	262	186	0	0	0	74
Sum	3,855	2,551	7,889	8,058	4,314	6,349	8,212	7,274	2,372	0	0	1,339

Month	Extreme Gage Feet		Current Year 1969				Average Second Feet	Total Acre Feet	Period 1961-1969		
	High	Low	Extreme Second Feet		Low	Acre Feet			Average	Maximum	Minimum
			Day	High			Day	Low			
Jan.			† 3	230	† 16	0	124	7, 646	9, 036	19, 452	0
Feb.			27	164	† 1	0	91	5, 060	8, 309	16, 784	0
Mar.			21	308	1	188	254	15, 648	15, 352	18, 742	8, 434
Apr.			14	318	30	118	269	15, 983	15, 461	18, 573	11, 948
May			† 27	180	11	115	139	8, 557	13, 492	19, 783	8, 557
June			† 19	247	3	152	212	12, 593	14, 801	19, 186	12, 593
July			13	364	19	196	265	16, 288	17, 258	19, 295	15, 072
Aug.			† 1	282	31	186	235	14, 428	16, 815	18, 887	14, 428
Sept.			4	195	† 7	0	79.1	4, 705	12, 315	18, 313	4, 705
Oct.				0	0	0	0	0	7, 896	18, 625	0
Nov.				0	0	0	0	0	7, 549	17, 627	0
Dec.			9	90	† 1	0	43.2	2, 656	7, 517	18, 988	930
Yearly				364		0	143	103, 564	145, 801	215, 087	102, 265

‡ Mean daily † And other days

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank and cableway at the point where the northerly international land boundary (California-Baja California) intersects the Colorado River, 6.4 miles downstream from Colorado River below Yuma Main Canal Wasteway, 3 miles west of Yuma, Arizona, 1.1 miles upstream from Morelos Diversion Structure, and about one mile downstream from Rockwood Gage. Zero of gage is at mean sea level, U. S. C. & G. S. datum. Station is operated by the United States Section of the Commission.

RECORDS: Based on 415 current meter measurements during the year, 209 by the United States Section, 194 by the Mexican Section of the Commission, 12 by the U. S. Geological Survey, and a continuous record of gage heights. Computations by shifting control methods. Discharges are computed on the basis of a water-stage recorder located 1,680 feet upstream from the northerly international boundary where the remains of an old weir serve as a partial controlling section. A continuous gage height record is available November 15, 1948 through 1969; daily discharge records available January 1, 1950 through 1969.

REMARKS: Reservoirs on the Colorado River, including Lake Mead above Hoover Dam, where storage began in 1935, reservoirs on the Gila River, and many irrigation diversions and return flows regulate the river flow at this station except for infrequent flood flows. During 1969, the flow at this point represented the total amount of Colorado River water which crossed the northerly international boundary.

EXTREMES: Prior to January 1935: Maximum instantaneous discharge estimated about 250,000 second-feet, January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 13,443,000 acre-feet; maximum annual flow 25,480,000 acre-feet, 1907; minimum annual flow 1,174,000 acre-feet, 1934. Since January 1935: Maximum mean daily discharge, about 33,000 second-feet, February 7, 1942; minimum discharge, no flow during April 1935.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
1	2,130	733	2,250	3,780	1,410	1,220	2,210	2,910	1,870	718	701	* 650		
2	2,430	740	2,570	3,870	1,480	1,190	2,210	2,890	1,860	700	708	* 650		
3	2,750	722	2,530	3,840	1,440	1,160	2,200	2,930	1,880	718	671	660		
4	2,740	775	2,540	3,850	1,440	1,190	2,210	2,920	1,890	704	* 738	* 637		
5	2,710	744	2,530	3,880	1,420	1,230	2,210	2,940	1,860	700	* 708	* 670		
6	2,650	735	2,550	3,830	1,430	1,220	2,210	3,000	1,930	707	743	650		
7	2,740	781	2,500	3,860	1,410	1,180	2,470	3,000	1,810	692	707	721		
8	2,790	743	2,560	3,910	1,410	1,170	2,600	3,000	1,870	716	731	1,040		
9	2,790	763	2,640	3,870	1,430	1,170	2,600	3,010	1,620	722	731	1,380		
10	2,800	770	2,590	3,790	1,340	1,390	2,600	3,010	1,630	686	1,010	1,420		
11	2,750	851	2,580	3,640	1,210	1,790	2,600	2,990	1,200	734	1,890	1,410		
12	2,800	1,250	2,510	3,600	1,150	1,790	2,590	2,720	1,130	720	1,900	1,440		
13	2,760	1,340	2,510	3,580	1,140	1,950	2,600	2,670	1,170	731	923	1,410		
14	2,850	1,680	2,860	3,550	1,100	1,930	2,640	2,640	1,180	753	* 646	1,440		
15	2,930	1,920	3,220	3,520	1,110	2,200	2,640	2,640	1,170	746	785	1,370		
16	3,530	1,860	3,300	3,590	1,170	2,230	2,610	2,630	* 747	750	1,300	1,370		
17	2,080	1,880	3,470	3,590	1,150	2,180	2,620	2,460	* 736	765	1,160	1,380		
18	1,620	1,860	3,510	3,590	1,130	2,180	2,610	2,250	* 691	798	811	1,370		
19	1,460	1,960	3,570	3,490	1,160	2,230	2,630	2,230	* 677	769	753	1,350		
20	1,230	1,970	3,510	3,360	1,140	2,210	2,630	2,130	* 677	747	635	1,360		
21	982	1,980	3,560	3,460	1,170	2,210	2,630	2,140	* 677	736	668	1,400		
22	622	1,960	3,530	3,230	1,170	2,210	2,630	2,100	* 666	762	* 721	1,470		
23	790	1,960	3,560	2,940	1,160	2,240	2,630	2,140	u 596	756	* 646	1,400		
24	722	1,950	3,440	2,900	1,170	2,240	2,630	2,170	u 666	753	644	1,410		
25	735	1,970	3,550	2,860	1,170	2,240	2,640	2,170	741	719	672	1,420		
26	752	1,970	3,600	2,540	1,240	2,200	2,670	2,170	728	712	645	1,400		
27	747	2,040	3,610	2,290	1,200	2,270	2,670	2,160	746	696	650	1,380		
28	756	2,010	3,540	2,030	1,190	2,270	2,670	2,160	752	701	* 643	1,400		
29	795		3,620	1,730	1,200	2,280	2,640	2,170	772	688	* 649	1,440		
30	783		3,600	1,430	1,240	2,220	2,670	1,920	739	704	* 648	1,790		
31	744		3,520		1,240		2,700	1,910		733		2,010		
Sum	58,968	39,917	95,430	99,400	38,820	55,190	78,870	78,180	34,381	22,536	24,837	38,898		
Month	Current Year 1969											Period 1935-1969		
	Extreme Gage Feet		Extreme Second Feet					Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	High	Low	Day	Average			Maximum	Minimum			
Jan.	104.87	102.09	16	3,690	22	546	1,900	116,961	464,230	1,644,000	31,900			
Feb.	103.70	102.30	27	2,100	3	690	1,430	79,174	386,653	1,378,000	60,400			
Mar.	104.93	103.62	23	3,750	1	1,980	3,080	189,283	378,473	1,120,000	19,400			
Apr.	105.20	102.88	9	4,040	30	1,360	3,310	197,157	291,760	823,850	0			
May	103.15	102.74	2	1,510	11	1,040	1,250	76,998	307,006	1,151,000	72,278			
June	103.85	102.61	29	2,350	10	1,060	1,840	109,468	286,108	1,175,000	8,500			
July	104.21	103.66	19	2,760	1	2,140	2,540	156,436	272,764	763,800	24,400			
Aug.	104.48	103.40	9	3,070	28	1,760	2,520	155,068	290,888	791,600	43,800			
Sept.	103.62	101.99	6	2,170	24	539	1,150	68,194	268,513	1,029,000	60,000			
Oct.	102.50	101.99	18	974	10	539	727	44,700	272,888	1,186,000	42,363			
Nov.	103.60	u 102.02	12	1,980	5	511	828	49,263	344,425	1,422,000	42,363			
Dec.	103.60	102.05	31	2,040	4	565	1,250	77,153	440,525	1,832,000	42,000			
Yearly	105.20	101.99		4,040		511	1,823	1,319,855	4,004,223	10,596,900	722,100			

* Partly estimated u Estimated

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	103.70	102.36	103.84	104.96	102.93	102.74	103.74	104.36	103.38	102.15	102.22	* 102.12
2	103.91	102.36	104.06	105.04	103.01	102.71	103.75	104.34	103.38	102.14	102.22	* 102.11
3	104.15	102.34	104.04	105.00	103.08	102.68	103.73	104.38	103.39	102.14	102.19	* 102.14
4	104.19	102.40	104.06	105.02	103.10	102.76	103.74	104.37	103.40	102.11	* 102.26	* 102.12
5	104.13	102.34	104.07	105.04	103.09	102.73	103.74	104.39	103.36	102.13	* 102.22	* 102.16
6	104.10	102.36	104.05	104.98	103.09	102.72	103.75	104.45	103.43	102.14	102.27	102.15
7	104.18	102.42	104.04	105.00	103.09	102.69	104.00	104.42	103.33	102.12	102.23	102.20
8	104.22	102.35	104.12	105.06	103.09	102.67	104.10	104.42	103.39	102.16	102.24	102.54
9	104.20	*102.36	104.13	105.04	103.11	102.68	104.08	104.42	103.16	102.17	102.24	102.90
10	104.21	*102.35	104.07	104.96	103.04	102.90	104.08	104.41	102.86	102.14	102.50	102.96
11	104.21	*102.46	104.07	104.86	102.92	103.24	104.08	104.40	102.72	102.17	103.38	102.97
12	104.20	102.88	104.04	104.85	102.82	103.30	104.07	104.17	102.65	102.17	103.51	102.99
13	104.18	102.99	104.04	104.83	102.81	103.45	104.08	104.12	102.67	102.20	102.49	103.00
14	104.24	103.34	104.29	104.71	102.79	103.46	104.11	104.08	102.69	102.33	* 102.22	102.97
15	104.28	103.53	104.57	104.69	102.78	103.70	104.11	104.10	102.67	102.27	102.35	102.93
16	104.76	103.49	104.64	104.76	102.74	103.73	104.09	104.09	* 102.25	102.23	102.87	102.94
17	103.64	103.50	104.76	104.81	102.72	103.70	104.10	103.93	* 102.20	102.24	102.71	102.95
18	103.25	103.50	104.82	104.79	102.71	103.70	104.08	103.72	* 102.18	102.28	102.34	102.95
19	103.12	103.60	104.86	104.70	102.72	103.74	104.10	103.71	* 102.16	102.24	102.30	102.93
20	102.90	103.60	104.81	104.63	102.72	103.72	104.09	103.62	* 102.15	102.18	102.15	102.94
21	102.60	103.59	104.83	104.67	102.74	103.73	104.09	103.63	* 102.16	102.18	102.20	102.99
22	^u 102.18	103.59	104.83	104.48	102.73	103.74	104.10	103.61	* 102.14	102.20	* 102.28	103.06
23	* 102.39	103.59	104.81	104.26	102.72	103.76	104.10	103.64	^u 102.09	102.19	* 102.19	102.99
24	102.30	103.58	104.74	104.21	102.72	103.75	104.09	103.66	^u 102.12	102.20	102.18	103.00
25	102.33	103.61	104.82	104.17	102.73	103.76	104.12	103.66	^u 102.20	102.16	102.20	103.00
26	102.37	103.61	104.83	103.93	102.77	103.73	104.16	103.67	* 102.17	102.18	102.18	102.98
27	102.36	103.66	104.82	103.72	102.74	103.77	104.15	103.65	102.18	102.20	102.12	102.97
28	102.35	103.62	104.80	103.48	102.73	103.77	104.15	103.66	102.20	102.22	* 102.11	102.96
29	102.39		104.88	103.25	102.74	103.79	104.14	103.67	102.19	102.20	* 102.13	103.01
30	102.37		104.86	102.96	102.77	103.76	104.14	103.45	102.16	102.20	* 102.15	103.35
31	102.35		104.78		102.75		104.18	103.44		102.26		103.57
Avg.	103.41	103.05	104.46	104.56	102.85	103.35	104.03	103.99	102.63	102.19	102.36	102.80

^u Estimated * Partly estimated

COLORADO RIVER IMMEDIATELY ABOVE MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico attached to the upstream abutment of the gates of the Intake Canal at Morelos Dam, 1.1 miles downstream from the northerly international boundary, and about 7.5 miles downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969 zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date zero of the gage was 0.16 foot below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage height records November 8, 1950 to June 3, 1951; a continuous record of gage heights June 4, 1951 through 1969.

REMARKS: Prior to June 4, 1951, when a continuous water-stage recorder was installed, mean daily gage height records were determined from hourly readings of a staff gage.

EXTREMES: Since November 8, 1950: Maximum mean daily elevation above mean sea level, 112.70 on January 2, 1958; minimum mean daily elevation above mean sea level, 101.51 on February 17, 1957.

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	102.89	101.87	102.92	103.84	102.36	102.20	102.92	103.35	102.72	101.84	101.84	101.80
2	103.05	101.87	103.08	103.90	102.40	102.20	102.92	103.35	102.69	101.84	101.84	101.80
3	103.25	101.87	103.12	103.87	102.46	102.17	102.92	103.38	102.72	101.84	101.84	101.80
4	103.25	101.90	103.12	103.90	102.46	102.26	102.92	103.35	102.72	101.84	101.90	101.77
5	103.22	101.84	103.15	103.90	102.40	102.20	102.92	103.41	102.69	101.80	101.87	101.80
6	103.18	101.87	103.15	103.90	102.40	102.20	102.92	103.48	102.76	101.84	101.90	101.77
7	103.25	101.90	103.15	103.90	102.40	102.20	103.12	103.44	102.69	101.84	101.87	101.84
8	103.28	101.87	103.18	103.90	102.40	102.17	103.18	103.41	102.69	101.84	101.87	102.10
9	103.28	101.87	103.18	103.87	102.40	102.20	103.15	103.41	102.53	101.84	101.87	102.36
10	103.25	101.87	103.15	103.84	102.33	102.36	103.15	103.41	102.30	101.80	102.07	102.40
11	103.25	101.94	103.18	103.77	102.26	102.59	103.15	103.41	102.23	101.87	102.69	102.40
12	103.25	102.26	103.15	103.77	102.20	102.62	103.12	103.25	102.20	101.87	102.85	102.40
13	103.25	102.33	103.15	103.74	102.20	102.72	103.15	103.22	102.20	101.84	102.07	102.40
14	103.28	102.53	103.31	103.67	102.17	102.72	103.18	103.22	102.20	102.03	101.84	102.36
15	103.31	102.69	103.54	103.67	102.20	102.92	103.18	103.22	102.17	101.87	101.97	102.36
16	103.71	102.62	103.58	103.71	102.17	102.95	103.18	103.22	101.87	101.87	102.33	102.36
17	102.85	102.66	103.64	103.74	102.13	102.95	103.18	103.12	101.84	101.87	102.20	102.36
18	102.53	102.69	103.71	103.74	102.13	102.92	103.18	102.99	101.80	101.84	102.00	102.36
19	102.43	102.76	103.71	103.67	102.13	102.99	103.18	102.95	101.80	101.87	101.97	102.36
20	102.23	102.79	103.71	103.61	102.17	102.95	103.18	102.89	101.80	101.84	101.87	102.36
21	102.03	102.76	103.74	103.64	102.20	102.95	103.15	102.92	101.80	101.84	101.87	102.40
22	101.74	102.76	103.77	103.51	102.17	102.92	103.18	102.89	101.80	101.84	101.90	102.43
23	101.87	102.76	103.74	103.31	102.17	102.95	103.18	102.92	101.77	101.84	101.80	102.40
24	101.80	102.76	103.74	103.31	102.17	102.95	103.18	102.92	101.80	101.84	101.80	102.40
25	101.84	102.76	103.74	103.28	102.20	102.95	103.18	102.92	101.84	101.80	101.84	102.40
26	101.87	102.79	103.74	103.08	102.23	102.92	103.22	102.92	101.84	101.80	101.84	102.36
27	101.87	102.79	103.74	102.95	102.20	102.95	103.22	102.92	101.84	101.84	101.80	102.36
28	101.87	102.79	103.71	102.76	102.20	102.95	103.22	102.92	101.84	101.84	101.80	102.36
29	101.90		103.77	102.59	102.20	102.99	103.22	102.92	101.87	101.84	101.80	102.40
30	101.87		103.81	102.40	102.23	102.95	103.22	102.76	101.84	101.87	101.80	102.66
31	101.87		103.71	102.23	102.23		103.25	102.76		101.87		102.82
Avg.	102.66	102.36	103.45	103.56	102.26	102.67	103.13	103.14	102.16	101.85	101.96	102.26

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 200 feet downstream from the intake at Morelos Dam, 1,350 feet upstream from the point where it joins the old Alamo Canal, 2.2 miles upstream from Matamoras Check, and about one mile south of the northerly international boundary. Zero of gage is 0.16 foot below mean sea level, U. S. C. & G. S. datum.

RECORDS: The records are deduced from the flows arriving in the limitrophe section of the Colorado River at the northerly international boundary, the flows that pass downstream from the structure, and leakage through the structure. Records available: November 8, 1950 through 1969. Records obtained and furnished by the Mexican Section of the Commission.

REMARKS: The canal is operated with a minimum hydraulic slope to permit the maximum retention of silt above Matamoras Check and the lower velocities in the canal do not permit measuring the flow with a current meter. Records for this station show the amounts of Colorado River water diverted at Morelos Diversion Dam to the Intake Canal and thence to the Alamo Canal for use in Mexico. Water for use in Mexico may also be diverted to the Alamo Canal in the United States directly from the river at Rockwood Head or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District under conditions set forth in the 1944 Water Treaty. No diversions of the above nature have been made during the years 1951 through 1969 and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Other diversions from the Colorado River are made by Mexico downstream from Morelos Dam by means of pumps.

EXTREMES: Maximum mean daily discharge, 6,540 second-feet, August 3, 1958; maximum mean daily gage height, 107.22 feet on November 8, 1950. Minimum daily discharge, no flow on various occasions.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,130	727	2,240	3,780	1,400	1,210	2,200	2,900	1,860	713	689	646
2	2,430	735	2,560	3,850	1,470	1,190	2,200	2,880	1,850	696	703	646
3	2,750	717	2,520	3,810	1,430	1,150	2,190	2,920	1,870	713	667	657
4	2,740	770	2,530	3,850	1,430	1,180	2,200	2,910	1,880	703	735	636
5	2,710	742	2,520	3,880	1,420	1,230	2,200	2,930	1,850	696	703	667
6	2,650	731	2,540	3,810	1,420	1,210	2,200	2,990	1,920	703	742	646
7	2,740	777	2,490	3,850	1,400	1,180	2,460	2,990	1,800	689	703	717
8	2,790	738	2,550	3,880	1,390	1,170	2,600	2,990	1,870	710	727	1,040
9	2,790	759	2,630	3,850	1,430	1,170	2,600	3,010	1,610	720	727	1,370
10	2,800	766	2,580	3,780	1,390	1,380	2,600	3,010	1,330	682	1,010	1,420
11	2,750	837	2,570	3,640	1,210	1,780	2,600	2,980	1,200	731	1,780	1,410
12	2,800	1,250	2,510	3,600	1,140	1,780	2,590	2,710	1,130	717	1,530	1,440
13	2,750	1,330	2,510	3,570	1,130	1,940	2,590	2,670	1,170	727	883	1,440
14	2,850	1,670	2,850	3,530	1,090	1,920	2,630	2,630	1,170	749	643	1,410
15	2,930	1,910	3,200	3,510	1,110	2,190	2,630	2,630	1,160	742	780	1,370
16	3,530	1,850	3,290	3,570	1,170	2,220	2,600	2,620	745	749	1,280	1,370
17	2,080	1,870	3,460	3,570	1,140	2,180	2,610	2,450	735	756	1,090	1,380
18	1,620	1,850	3,500	3,570	1,130	2,170	2,600	2,240	689	795	798	1,370
19	1,450	1,950	3,570	3,480	1,150	2,220	2,620	2,220	675	759	745	1,350
20	1,230	1,960	3,500	3,350	1,130	2,210	2,620	2,130	675	745	632	1,360
21	978	1,970	3,530	3,450	1,170	2,210	2,620	2,130	675	735	660	1,400
22	618	1,950	3,520	3,220	1,170	2,210	2,620	2,090	664	756	710	1,470
23	788	1,950	3,530	2,930	1,150	2,240	2,620	2,130	593	752	639	1,400
24	717	1,940	3,430	2,890	1,170	2,240	2,620	2,160	660	749	636	1,410
25	731	1,960	3,530	2,850	1,160	2,240	2,630	2,160	735	717	667	1,420
26	749	1,960	3,600	2,540	1,230	2,200	2,670	2,160	720	703	643	1,390
27	742	2,030	3,600	2,280	1,190	2,260	2,660	2,150	742	689	643	1,370
28	752	2,000	3,530	2,030	1,180	2,260	2,670	2,150	749	699	639	1,400
29	791		3,600	1,730	1,190	2,270	2,630	2,160	770	678	643	1,440
30	780		3,600	1,430	1,230	2,210	2,660	1,910	735	703	639	1,780
31	742		3,510		1,240		2,690	1,910		724		2,000
Sum	58,908	39,699	95,100	99,080	38,600	55,020	78,630	77,920	34,232	22,400	24,086	38,825

Month	Current Year 1969						Period Nov. 1950-1969				
	Extreme Gage Feet		Extreme Second Feet		Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	High	Low			Average	Maximum	Minimum		
Jan.	103.61	98.85	16	3,530	22	618	1,900	116,737	58,161	116,737	966
Feb.	101.25	98.95	27	2,030	3	717	1,420	78,773	53,758	101,685	9,232
Mar.	102.36	101.18	† 26	3,600	1	2,240	3,070	188,632	165,738	216,994	97,902
Apr.	102.85	100.07	† 5	3,880	30	1,430	3,300	196,540	196,951	264,127	158,162
May	100.59	99.21	2	1,470	14	1,090	1,250	76,588	97,870	159,000	66,207
June	102.79	99.25	29	2,270	3	1,150	1,830	109,117	171,059	269,632	109,117
July	101.94	100.69	31	2,690	3	2,190	2,540	156,047	242,076	304,263	156,047
Aug.	103.15	100.30	† 9	3,010	† 30	1,910	2,510	154,653	241,757	341,044	154,653
Sept.	100.49	98.95	6	1,920	23	593	1,140	67,902	140,229	198,095	67,902
Oct.	102.13	98.75	18	795	29	678	724	44,423	49,251	90,639	10,453
Nov.	101.97	98.82	11	1,780	20	632	802	47,750	36,103	103,954	7,516
Dec.	100.62	98.85	31	2,000	4	636	1,250	76,903	56,635	131,440	8,825
Yearly	103.61	98.75		3,880		593	1,810	1,314,065	1,512,523	1,961,556	1,306,276

† Mean daily † And other days

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - STAGES

(See Preceding Page For Description)

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	101.44	99.05	101.25	102.66	100.13	99.31	100.72	102.10	100.33	99.15	99.31	98.95
2	101.61	99.08	101.38	102.72	100.16	99.38	100.69	102.20	100.33	99.05	99.34	98.92
3	102.03	99.05	101.44	102.69	100.20	100.36	100.69	102.20	100.33	99.08	99.38	98.95
4	102.07	99.11	101.44	102.76	100.20	101.61	100.69	102.46	100.36	99.05	99.34	98.92
5	102.03	99.02	101.48	102.72	100.20	101.18	100.69	102.92	100.33	99.05	99.38	98.92
6	102.00	99.05	101.44	102.72	100.23	100.82	100.69	103.08	100.39	99.08	99.38	98.95
7	102.03	99.08	101.44	102.72	100.20	100.30	101.02	102.89	100.33	99.05	99.41	98.92
8	102.07	99.05	101.48	102.79	100.20	99.84	101.28	102.72	100.36	99.08	99.38	99.15
9	102.03	99.05	101.41	102.76	100.23	99.41	101.31	102.53	100.13	98.85	99.38	99.77
10	102.03	99.05	101.38	102.76	100.03	99.61	101.28	102.53	99.90	98.88	99.84	100.16
11	102.03	99.11	101.38	102.72	99.61	100.00	101.35	102.49	99.80	99.41	101.35	100.20
12	102.00	99.74	101.31	102.69	99.57	100.00	101.38	102.43	99.57	99.90	101.71	100.16
13	102.03	100.03	101.35	102.66	99.57	100.16	101.38	102.46	99.31	100.79	101.41	100.16
14	102.03	100.30	101.64	102.62	99.57	100.30	101.51	102.17	99.31	101.77	100.66	100.13
15	102.10	100.75	102.10	102.62	100.00	100.69	101.54	101.87	99.34	100.95	99.57	100.13
16	103.28	100.69	102.20	102.53	100.26	100.69	101.51	101.84	99.11	99.70	100.49	100.16
17	102.13	100.69	102.23	102.40	100.16	100.69	101.51	101.35	99.08	99.44	101.35	100.16
18	101.61	100.69	102.23	102.40	99.90	100.69	101.54	100.85	99.11	99.51	101.18	100.13
19	100.43	101.08	102.23	102.30	99.80	100.72	101.54	100.82	99.08	99.44	100.82	100.16
20	99.90	101.18	102.20	102.30	99.64	100.69	101.51	100.69	99.05	99.38	99.64	100.16
21	99.54	101.15	102.23	102.30	99.25	100.72	101.51	100.66	99.11	99.38	99.28	100.23
22	98.95	101.15	102.26	102.26	99.28	100.72	101.54	100.66	99.05	99.41	99.08	100.26
23	99.15	101.15	102.23	102.00	99.31	100.72	101.51	100.66	99.02	99.38	98.95	100.20
24	99.05	101.15	102.20	101.77	99.28	100.72	101.54	100.62	99.08	99.38	98.95	100.16
25	99.05	101.15	102.26	101.71	99.34	100.75	101.54	100.62	99.15	99.34	98.98	100.20
26	99.08	101.15	102.26	101.51	99.48	100.72	101.57	100.66	99.15	99.38	98.92	100.16
27	99.08	101.18	102.30	101.21	99.48	100.75	101.54	100.62	99.15	99.48	98.88	100.16
28	99.08	101.15	102.30	101.15	99.41	100.75	101.54	100.62	99.15	99.41	98.85	100.13
29	99.11		102.33	100.82	99.34	100.75	101.54	100.62	99.18	99.34	98.92	100.16
30	99.11		102.33	100.16	99.51	100.72	101.57	100.39	99.08	99.41	98.95	100.33
31	99.05		102.26		99.48		101.64	100.33		99.70		100.62
Avg.	100.88	100.15	101.87	102.25	99.77	100.45	101.32	101.58	99.56	99.49	99.74	99.86

COLORADO RIVER IMMEDIATELY BELOW MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico immediately downstream from Morelos Dam, 1.1 miles downstream from the northerly international boundary, and about 7.5 miles downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969 zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date zero of the gage was 0.16 foot below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage heights, February 20, 1951 to June 6, 1966; continuous record of gage heights June 7, 1966 through 1969.

REMARKS: On June 7, 1966 a continuous water-stage recorder was installed; prior to this date mean daily gage heights were determined from hourly readings of a staff gage.

EXTREMES: Maximum mean daily gage height, 112.63 feet, January 2, 1958; minimum mean gage height, 98.13 feet, various days of March and April 1967.

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	100.00	100.66	99.70	99.25	99.77	99.41	99.21	99.31	98.59	100.16	100.59	100.62
2	99.87	100.66	99.61	99.25	99.74	99.57	99.25	99.31	98.59	100.20	100.59	100.59
3	99.77	100.66	99.54	99.25	99.74	99.54	99.25	99.31	98.59	100.23	100.62	100.62
4	99.74	100.62	99.57	99.25	99.74	99.44	99.21	99.31	98.59	100.20	100.66	100.62
5	99.74	100.62	99.57	99.25	99.74	99.44	99.21	99.31	98.59	100.23	100.66	100.62
6	99.70	100.62	99.61	99.25	99.70	99.51	99.21	99.31	98.62	100.26	100.69	100.62
7	99.67	100.59	99.61	99.25	99.61	99.57	99.21	99.31	98.59	100.30	100.75	100.59
8	99.67	100.49	99.54	99.25	99.64	99.57	99.21	99.31	98.59	100.26	100.75	100.59
9	99.67	100.33	99.51	99.25	99.74	99.57	99.21	99.31	98.59	100.26	100.75	100.30
10	99.67	100.30	99.51	99.25	99.74	99.51	99.21	99.31	98.69	100.26	100.82	100.26
11	99.67	100.10	99.54	99.25	99.80	99.41	99.25	99.31	98.82	100.30	101.21	100.30
12	99.70	100.03	99.54	99.25	99.80	99.41	99.25	99.31	98.92	100.36	102.10	100.33
13	99.67	100.07	99.54	99.25	99.80	99.38	99.25	99.31	98.92	100.39	100.85	100.36
14	99.70	100.00	99.44	99.25	99.84	99.28	99.25	99.34	98.98	100.39	100.72	100.36
15	99.61	99.97	99.38	99.25	99.84	99.18	99.25	99.34	99.08	100.43	100.72	100.36
16	100.75	99.97	99.34	99.21	99.80	99.25	99.25	99.34	99.67	100.43	100.66	100.33
17	100.39	99.84	99.34	99.21	99.84	99.21	99.25	99.34	99.90	100.33	100.89	100.33
18	99.93	99.80	99.31	99.21	99.77	99.18	99.25	99.31	99.97	100.26	100.62	100.33
19	100.07	99.80	99.31	99.21	99.74	99.18	99.25	99.31	100.03	100.26	100.59	100.36
20	100.13	99.77	99.28	99.21	99.67	99.18	99.25	99.31	100.07	100.26	100.62	100.33
21	100.46	99.74	99.28	99.21	99.70	99.21	99.25	99.05	100.07	100.36	100.62	100.33
22	100.72	99.70	99.28	99.25	99.74	99.21	99.25	98.82	100.07	100.33	100.59	100.33
23	100.69	99.74	99.28	99.25	99.74	99.21	99.25	98.72	100.13	100.36	100.59	100.33
24	100.69	99.74	99.25	99.25	99.77	99.21	99.28	98.69	100.10	100.46	100.59	100.33
25	100.69	99.74	99.25	99.25	99.74	99.21	99.28	98.69	100.07	100.52	100.59	100.30
26	100.69	99.70	99.25	99.31	99.48	99.21	99.28	98.69	100.03	100.49	100.62	100.30
27	100.69	99.74	99.25	99.41	99.44	99.21	99.31	98.65	100.07	100.46	100.62	100.30
28	100.72	99.77	99.25	99.64	99.41	99.18	99.31	98.62	100.10	100.52	100.59	100.26
29	100.72		99.25	99.77	99.41	99.18	99.31	98.62	100.10	100.52	100.59	100.26
30	100.69		99.25	99.87	99.41	99.21	99.31	98.62	100.10	100.59	100.59	100.23
31	100.69		99.25		99.44		99.31	98.62		100.62		100.20
Avg.	100.15	100.10	99.41	99.30	99.69	99.33	99.25	99.10	99.37	100.35	100.73	100.39

WELLTON-MOHAWK DRAINAGE WATER DISCHARGED TO COLORADO RIVER BELOW MORELOS DAM

DESCRIPTION: Water-stage recorder located on downstream end of the Wellton-Mohawk Drainage Extension Channel on the Arizona bank of the Colorado River at the east end of the weir section of Morelos Dam, 1.1 miles downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.

RECORDS: Based on 20 discharge measurements and a continuous record of gage heights. Station is operated by the United States Section of the Commission. Records available: November 16, 1965 through 1969.

REMARKS: Pursuant to Minute 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 12 miles, and placed in operation on November 16, 1965. Drainage flows may be discharged to the Gila River and thence to the Colorado River at the diversion structure, Main Outlet Drain Extension No. 1, at the upstream end of the extension; directly to the Colorado River at Main Outlet Drain Extension No. 2, 1.9 miles upstream from Morelos Dam; and immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. The combined 1969 record of discharges to the river above Morelos Dam through M. O. D. E. No. 1 and No. 2 is shown on page 15.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
1	105	303	119	0	133	86.6	56.8	11.6	55.2	283	303	301		
2	82.3	303	101	0	130	105	65.8	3.1	52.8	292	306	304		
3	78.1	300	97.2	0	127	101	61.6	1.4	48.9	295	306	309		
4	75.4	298	96.2	0	126	92.4	55.2	0	53.6	292	308	311		
5	77.2	296	101	0	127	92.4	54.4	0	67.7	296	309	311		
6	79.0	296	106	0	126	97.2	53.6	0	75.4	296	317	308		
7	78.1	292	101	0	114	111	35.5	0	48.1	300	325	304		
8	79.0	270	97.2	0	125	112	21.8	0	34.9	292	327	303		
9	79.0	237	94.3	0	130	113	25.5	0	64.3	289	327	225		
10	79.0	234	92.4	0	135	101	40.8	0	96.7	286	330	228		
11	80.9	182	93.3	0	146	86.9	47.3	0	115	294	328	245		
12	84.7	179	93.3	0	146	87.5	42.1	0	122	301	327	248		
13	86.6	183	92.4	0	142	80.0	25.5	24.1	126	303	325	256		
14	86.6	170	64.1	0	142	71.0	0	48.8	133	303	324	262		
15	60.4	169	29.2	0	146	54.9	0	45.0	144	301	320	261		
16	296	168	8.5	0	147	58.3	0	45.8	254	306	294	261		
17	216	144	2.3	0	144	59.1	0	57.0	275	279	301	252		
18	146	142	0	0	141	51.2	0	59.1	277	265	301	259		
19	173	142	0	0	129	45.8	0	64.1	282	261	296	263		
20	185	135	0	0	121	56.0	0	65.8	283	266	304	262		
21	257	126	0	0	127	59.1	0	61.6	280	286	303	262		
22	308	125	0	34.1	128	59.1	0	61.6	279	277	298	261		
23	308	125	0	46.0	130	52.8	0	61.6	288	282	301	256		
24	308	124	0	57.5	132	52.0	0	52.2	284	300	298	256		
25	306	124	0	58.3	133	52.0	0	55.2	272	311	306	256		
26	308	125	0	78.1	89.4	52.0	11.4	59.9	263	296	314	255		
27	308	126	0	91.4	89.4	48.1	33.6	59.9	273	286	311	255		
28	308	133	0	119	83.7	45.0	31.1	62.4	277	298	306	254		
29	308	0	0	136	85.6	42.8	25.8	51.4	272	296	301	254		
30	308	0	0	153	87.5	49.7	26.4	51.0	273	306	300	242		
31	306	0	0		88.5		30.5	59.7		309		231		
Sum	5,560.3	5,451	1,388.4	773.4	3,851.1	2,174.9	744.7	1,062.3	5,369.6	9,047	9,316	8,255		
Current Year 1969												Period 1966-1969		
Month	Ø Extreme Gage Feet		Ø Extreme Second-Feet					Average Second-Feet	Total Acre-Feet	Acre-Feet				
	High	Low	Day	High	Low	Day	Average			Maximum	Minimum			
Jan.	3.16	1.07	† 22	308	15	60.4	179	11,029	14,148	17,740	11,029			
Feb.	3.13	1.81	† 1	303	† 24	124	195	10,812	11,490	15,154	9,992			
Mar.	1.77		1	119	† 18	0	44.8	2,754	3,232	4,879	1,943			
Apr.	2.04		30	153	† 1	0	25.8	1,534	1,960	3,977	1,053			
May	1.98	1.38	16	147	28	83.7	124	7,639	6,151	8,019	3,160			
June	1.68	.91	9	113	29	42.8	72.5	4,314	3,315	4,314	2,098			
July	1.20		2	65.8	† 14	0	24.0	1,477	1,168	2,530	0			
Aug.	1.17		20	65.8	† 4	0	34.3	2,107	1,087	2,107	34.9			
Sept.	3.03	.77	23	288	8	34.9	179	10,650	8,154	10,892	3,575			
Oct.	3.17	2.80	25	311	19	261	292	17,944	17,895	18,220	17,599			
Nov.	3.30	3.07	10	330	16	294	311	18,478	17,797	18,478	17,234			
Dec.	3.18	2.58	† 4	311	9	225	266	16,374	15,816	16,374	14,989			
Yearly	3.30	0		330	0	145	105,112	102,213	105,112	100,028				

Ø Mean daily

† And other days

COOPER WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging regulatory waste water from the Cooper Canal to the Colorado River. This wasteway is located 1.5 miles downstream from the northerly international boundary and 0.4 mile downstream from Morelos Diversion Dam. This is one of three wasteways discharging wastewater from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, March 1950 through 1969, obtained by the United States Section; monthly discharge, January 1934 through March 1950, by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge, 914 acre-feet in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 79.3 second-feet on June 19, 1965, at a maximum gage height of 114.13 feet; minimum instantaneous discharge, zero during parts of each month.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	1.4	1.6	0.6	0.5	0.8	1.1	4.8	0.3	0	0.3	2.2
2	2.5	.3	3.7	3.7	3.0	3.5	.6	.5	0	1.5	.2	.4
3	2.0	.2	2.4	6.9	5.7	2.3	3.8	2.8	.3	3.8	.6	.2
4	1.3	6.5	1.9	3.9	6.0	1.3	2.7	.2	1.4	1.9	4.7	.2
5	6.5	4.6	.7	5.3	5.4	3.4	1.1	0	1.7	1.9	.4	0
6	.7	3.1	2.3	.8	2.2	3.1	1.1	0	.9	1.3	.4	.1
7	.2	.7	2.6	.7	1.1	.2	.8	0	.5	1.0	1.5	.4
8	0	.6	.5	1.2	.9	.7	.3	1.3	.4	.4	.2	.5
9	0	.5	.6	2.7	.7	1.4	1.2	.5	.2	.4	.9	.6
10	.5	1.1	2.4	1.1	.5	.7	2.9	.3	.1	.4	.8	.6
11	2.2	3.1	.4	2.8	.8	.8	1.3	1.7	.2	1.7	.4	.5
12	4.4	.8	5.8	.4	1.3	2.1	.3	3.6	2.0	4.3	.2	3.4
13	1.5	.3	4.4	.4	5.2	3.8	.1	4.0	.3	5.3	.2	.7
14	3.6	.2	.8	.3	4.6	1.6	0	1.5	.5	4.6	.6	2.1
15	2.1	.2	.3	.2	3.8	.7	0	.3	.7	4.9	.6	2.8
16	1.2	2.4	8.0	.3	.8	5.8	.7	.1	.7	2.4	.6	.8
17	.5	1.0	.5	.2	5.0	2.9	.8	1.0	.5	2.2	1.9	6.3
18	.6	.2	.1	.8	.9	2.2	.1	1.1	4.0	1.8	.7	1.2
19	.6	0	0	.5	.6	1.4	.4	1.0	5.7	4.7	.3	.8
20	.6	.2	.5	8.3	.6	.9	1.3	1.7	3.7	.3	.1	.6
21	.6	.6	1.8	2.4	1.5	1.9	1.1	.8	3.5	.2	0	.6
22	4.7	.5	1.5	.3	.6	1.0	1.8	1.5	3.3	.7	0	.7
23	1.1	2.3	.5	0	2.4	1.1	6.5	4.0	1.0	2.4	.1	.7
24	.5	2.3	.4	0	4.2	1.0	.4	2.3	1.0	3.7	.4	.7
25	.6	2.2	.4	.2	.4	1.6	.2	.4	.9	.3	1.4	.7
26	.4	1.7	.5	4.3	4.7	.3	3.1	1.3	.8	.3	1.5	.7
27	.2	2.1	.6	2.9	3.2	.1	3.2	2.4	.6	.5	.6	.7
28	.3	1.8	.5	4.3	.7	.1	4.1	2.2	.5	.5	.7	.8
29	.4		1.8	5.7	.3	.1	2.3	1.6	.5	.5	1.0	.6
30	.3		.8	2.1	.3	.7	.6	.8	.4	5.2	.6	.6
31	2.1		.6		2.7		1.9	.3		4.1		.7
Sum	47.2	40.9	48.9	63.3	70.6	47.5	45.8	44.0	36.6	63.2	21.9	31.9

Month	Extreme Gage Feet		Current Year 1969				Average Second-Feet	Total Acre-Feet	Period 1935-1969		
	High	Low	Extreme Second-Feet		Day	Average			Maximum	Minimum	
			High	Low							
Jan.	112.92	111.00	5	36.7	† 8	0	1.5	93.6	193	914	0
Feb.	111.98	111.00	1	13.7	† 18	0	1.5	81.1	168	400	6
Mar.	112.45	111.00	16	24.4	† 18	0	1.6	97.0	181	517	0
Apr.	112.56	111.00	26	27.1	† 22	0	2.1	126	196	425	40
May	112.55	111.02	17	26.8	26	.1	2.3	140	187	440	76
June	112.55	111.01	5	26.8	† 7	.1	1.6	94.2	176	595	47
July	112.41	111.00	3	23.4	† 14	0	1.5	90.8	161	516	0
Aug.	112.35	111.00	22	21.8	† 4	0	1.4	87.3	125	617	0
Sept.	112.23	111.00	18	18.8	2	0	1.2	72.6	124	462	0
Oct.	112.63	111.00	19	28.8	1	0	2.0	125	152	490	0
Nov.	112.59	111.00	4	27.8	† 21	0	.7	43.4	175	462	9
Dec.	112.37	111.00	17	22.4	5	0	1.0	63.3	206	592	63.3
Yearly	112.92	111.00		36.7		0	1.5	1,114	2,044	4,500	1,024

† And other days

COLORADO RIVER AT MORELOS GAGING STATION - DISCHARGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, and cableway 1.8 miles downstream from the northerly international boundary, 0.7 mile downstream from Morelos Diversion Dam, and about 9 miles downstream from Yuma, Arizona, along the river levee. The cableway and recorder are 1,260 feet and 1,300 feet, respectively, below the mouth of Cooper Wasteway. Zero of gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on 141 current meter measurements during the year, 99 by the United States Section, 42 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: Daily discharges, January 1, 1954 through 1969; continuous record of gage heights, July 20, 1952 through 1969.

REMARKS: Reservoirs, diversions in United States and Mexico, drainage returns, and waste flows modify the river flow at this station. The record at this station, less that of Cooper Wasteway and Main Outlet Drain Extension No. 3, represents the river flow passing Morelos Diversion Dam.

EXTREMES: Maximum instantaneous discharge, 22,240 second-feet on January 4, 1955; maximum gage height, 112.18 feet on January 28, 1958. Minimum discharge, no flow on various occasions.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	133	310	130	9.0	144	95.0	63.1	24.3	64.2	274	316	307
2	114	307	114	10.6	140	108	71.9	10.6	62.0	286	312	303
3	104	305	108	13.9	141	108	71.9	11.1	57.6	293	310	309
4	98.6	303	108	10.6	140	103	65.3	6.8	62.0	294	310	312
5	106	301	109	12.2	138	101	63.1	7.2	76.3	294	314	312
6	102	298	118	8.6	135	105	62.0	7.2	84.0	296	318	310
7	97.4	291	117	9.5	126	112	42.6	6.8	57.7	298	323	307
8	93.9	277	112	9.5	141	113	27.5	5.9	38.8	298	325	305
9	90.6	243	108	11.7	135	113	31.0	5.9	69.4	291	325	238
10	90.6	234	102	9.5	139	106	44.0	6.4	97.4	288	334	230
11	90.6	200	98.6	10.6	147	95.0	53.2	8.2	117	289	441	243
12	95.0	185	99.8	8.6	152	95.0	47.0	10.0	127	299	703	249
13	97.4	186	99.8	8.2	152	93.9	36.3	31.8	131	305	365	254
14	95.0	177	78.5	8.2	152	84.0	8.6	57.7	140	303	325	260
15	72.8	177	51.0	8.2	154	65.2	6.8	54.3	152	303	321	262
16	280	177	24.7	7.7	154	68.6	6.8	54.3	246	307	312	260
17	252	158	15.0	8.2	154	66.4	6.8	65.3	270	292	376	259
18	158	152	10.6	8.6	147	60.9	6.8	69.7	274	270	316	259
19	180	149	10.0	8.6	138	54.3	6.8	71.9	279	274	305	264
20	198	145	10.0	12.4	129	60.9	8.2	71.9	284	267	307	264
21	256	136	11.2	9.9	129	65.3	7.7	73.0	284	281	312	264
22	312	135	11.7	45.8	134	64.2	7.2	71.9	284	284	309	264
23	310	135	10.0	56.7	138	59.8	12.0	71.9	289	281	307	260
24	310	139	10.0	67.0	140	57.6	6.4	66.4	289	298	307	260
25	309	139	9.5	68.6	140	59.8	5.4	64.2	279	310	309	260
26	312	138	9.5	84.6	100	57.6	16.4	67.5	272	305	316	260
27	314	138	10.0	95.5	97.4	56.5	47.0	70.8	274	294	319	262
28	312	141	10.0	126	93.9	53.2	41.0	70.8	281	301	310	257
29	312	10.0	139	91.7	50.0	36.0	63.4	276	36.0	307	310	257
30	312	10.0	153	93.9	57.6	34.0	57.5	272	307	307	309	251
31	316	10.0	10.0	95.0	9.0	39.0	64.2	272	323	253	243	243
Sum	5,923.9	5,676	1,735.9	1,040.5	4,110.9	2,389.8	981.8	1,328.9	5,489.4	9,112	10,066	8,345

Month	Current Year 1969						Period 1954-1969				
	Extreme Gage Feet		Extreme Second-Foot				Average Second-Foot	Total Acre-Foot	Acre-Foot		
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum
Jan.	99.94	98.05	† 22	316	15	52.1	191	11,750	192,338	969,540	949
Feb.	99.94	99.00	1	314	22	134	203	11,258	97,401	414,310	977
Mar.	99.06	97.88	1	140	† 25	9.0	56.0	3,443	61,780	630,230	780
Apr.	99.12	97.83	30	156	16	7.7	34.7	2,064	48,359	532,320	899
May	99.26	98.81	17	161	28	89.5	133	8,154	57,415	375,970	460
June	99.00	98.45	2	114	28	45.0	79.7	4,740	13,472	119,980	834
July	98.77	97.88	3	80.7	26	5.0	31.7	1,947	12,727	89,430	654
Aug.	98.34	97.66	28	74.1	† 7	5.4	42.9	2,636	21,707	125,590	702
Sept.	99.59	97.57	23	291	7	29.2	183	10,888	18,597	87,830	113
Oct.	100.35	99.58	31	323	17	120	294	18,073	51,785	172,940	9,750
Nov.	102.03	100.25	12	768	† 19	303	336	19,966	95,899	356,390	4,869
Dec.	100.31	99.66	† 4	314	9	213	269	16,552	132,126	643,850	1,111
Yearly	102.03	97.57		768		5.0	154	111,471	803,606	3,957,730	101,758

† And other days

COLORADO RIVER AT MORELOS GAGING STATION - STAGES

(See Preceding Page For Description)

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	99.04	99.92	98.98	97.89	99.04	98.85	98.62	98.15	97.84	99.60	100.32	100.29
2	98.82	99.91	98.90	97.92	99.01	98.95	98.69	97.91	97.82	99.69	100.31	100.22
3	98.70	99.91	98.87	97.98	99.03	98.94	98.69	97.93	97.79	99.76	100.32	100.25
4	98.64	99.91	98.87	97.92	99.05	98.90	98.63	97.81	97.82	99.77	100.34	100.27
5	98.72	99.91	98.88	97.94	99.07	98.88	98.61	97.81	97.94	99.80	100.37	100.27
6	98.69	99.90	98.94	97.86	99.06	98.91	98.60	97.80	98.00	99.83	100.39	100.26
7	98.62	99.86	98.93	97.87	98.99	98.97	98.44	97.78	97.80	99.87	100.43	100.24
8	98.57	99.79	98.90	97.87	99.01	98.98	98.30	97.74	97.66	99.87	100.45	100.23
9	98.55	99.60	98.88	97.91	99.05	98.98	98.34	97.72	97.88	99.85	100.46	99.83
10	98.55	99.56	98.85	97.87	99.08	98.92	98.45	97.71	98.10	99.86	100.59	99.76
11	98.55	99.36	98.85	97.89	99.14	98.83	98.56	97.73	98.26	99.90	100.94	99.84
12	98.58	99.27	98.86	97.85	99.18	98.83	98.50	97.75	98.34	100.00	101.82	99.87
13	98.61	99.29	98.86	97.84	99.18	98.82	98.36	97.97	98.37	100.06	100.67	99.89
14	98.59	99.24	98.67	97.84	99.18	98.75	97.97	97.97	98.43	100.05	100.50	99.92
15	98.31	99.24	98.43	97.84	99.20	98.63	97.93	97.74	98.51	100.05	100.47	99.92
16	99.78	99.24	98.17	97.83	99.20	98.67	97.93	97.74	99.12	100.07	100.41	99.90
17	99.58	99.14	98.04	97.84	99.21	98.65	97.93	97.84	99.31	99.98	100.63	99.88
18	98.97	99.10	97.96	97.85	99.16	98.60	97.93	97.88	99.36	99.87	100.37	99.87
19	99.11	99.09	97.95	97.85	99.11	98.54	97.93	97.90	99.42	99.91	100.31	99.89
20	99.22	99.07	97.95	97.93	99.05	98.60	97.96	97.90	99.45	99.88	100.32	99.88
21	99.57	99.02	97.97	97.88	99.05	98.64	97.95	97.91	99.45	99.97	100.35	99.88
22	99.91	99.01	97.98	98.34	99.08	98.63	97.94	97.90	99.46	100.02	100.33	99.87
23	99.90	99.01	97.95	98.45	99.11	98.59	98.04	97.90	99.51	100.01	100.31	99.85
24	99.90	99.03	97.91	98.55	99.12	98.57	97.91	97.85	99.52	100.11	100.29	99.85
25	99.89	99.02	97.89	98.56	99.12	98.59	97.89	97.84	99.48	100.19	100.28	99.85
26	99.91	99.01	97.89	98.69	98.89	98.57	98.04	97.87	99.45	100.19	100.31	99.84
27	99.93	99.01	97.90	98.76	98.88	98.56	98.43	97.90	99.47	100.15	100.32	99.84
28	99.92	99.04	97.90	98.95	98.85	98.53	98.38	97.90	99.55	100.21	100.26	99.80
29	99.92		97.90	99.02	98.83	98.50	98.33	97.83	99.58	100.24	100.26	99.79
30	99.92		97.90	99.10	98.85	98.57	98.29	97.78	99.58	100.25	100.25	99.75
31	99.94		97.90		98.86		98.32	97.84		100.35		99.70
Avg.	99.19	99.37	98.38	98.13	99.05	98.73	98.25	97.85	98.74	99.98	100.45	99.95

ELEVEN MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona 4.3 miles downstream from the northerly international boundary and 3.2 miles downstream from Morelos Diversion Dam. It is the largest of the three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1969, obtained by the United States Section; monthly discharge, January 1924 through 1950, by Bureau of Reclamation.

EXTREMES: Prior to January 1951, maximum monthly discharge, 9,740 acre-feet in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 800 second-feet on December 3, 1961, at a maximum gage height of 117.60 feet; minimum instantaneous discharge, zero during parts of most years.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	4.0	6.6	3.7	4.5	2.9	1.2	2.2	4.2	1.3	1.4	26.9
2	1.9	8.2	2.9	4.6	1.0	2.9	1.1	7.4	7.2	1.2	2.1	9.0
3	1.7	6.0	4.7	1.0	5.9	1.3	2.0	39.3	1.1	1.4	2.4	6.1
4	1.0	1.4	4.0	3.9	6.1	1.2	1.0	16.3	1.0	1.3	3.3	1.6
5	53.6	4.1	4.5	7.6	7.3	1.2	1.0	3.5	1.0	2.1	1.5	.8
6	19.5	4.5	1.5	16.6	1.2	1.2	1.1	3.6	1.0	2.0	2.1	1.0
7	2.1	1.8	1.1	1.1	1.0	1.1	1.1	1.7	.9	3.8	1.5	1.0
8	2.1	1.6	11.3	1.1	1.4	.9	1.2	1.0	2.9	4.9	1.6	1.6
9	1.4	1.3	11.3	1.4	1.2	.9	2.4	1.1	1.1	1.6	1.9	1.0
10	2.5	1.3	10.9	6.4	2.2	3.3	1.2	2.0	1.1	3.5	26.2	3.9
11	1.0	1.3	1.4	1.2	7.2	.9	2.5	5.4	4.8	14.9	6.6	1.1
12	1.7	3.5	6.4	1.3	8.2	.9	3.4	2.4	5.3	66.3	1.1	1.9
13	13.9	1.2	1.3	4.0	2.1	2.3	9.1	.9	3.0	9.4	12.5	1.3
14	10.2	1.6	1.5	7.7	1.1	1.0	9.0	3.8	.9	2.1	4.8	1.3
15	2.6	1.2	3.2	1.2	1.0	3.5	2.5	7.3	1.5	2.0	43.5	3.2
16	1.7	19.3	61.2	1.5	2.3	10.0	1.1	1.0	1.1	3.8	103	10.3
17	6.2	9.1	25.1	1.1	1.2	9.3	1.0	1.0	7.0	6.2	13.0	5.4
18	11.4	5.4	4.6	2.0	2.7	1.5	2.0	2.3	1.0	1.5	2.2	7.5
19	1.7	5.4	4.6	1.2	6.1	7.6	1.5	4.7	.9	8.7	1.1	1.3
20	3.3	2.1	.9	38.8	1.0	2.1	11.9	2.1	5.5	3.8	1.0	1.2
21	10.8	.8	.9	43.4	1.0	.8	5.2	1.3	1.1	5.6	3.0	1.1
22	5.5	.8	.9	4.2	1.0	1.4	1.0	1.2	4.6	7.6	15.0	2.9
23	1.1	1.1	1.7	3.6	1.7	3.5	2.1	1.1	5.3	5.4	9.4	11.7
24	6.0	.8	10.7	1.5	9.2	1.4	2.4	1.9	3.2	4.5	6.0	1.1
25	1.3	.7	4.2	1.0	12.4	1.0	1.0	5.8	1.0	4.5	1.1	1.1
26	1.3	.9	6.2	1.0	5.9	1.0	.9	2.5	1.0	1.2	2.3	1.1
27	3.3	3.9	3.2	.9	2.5	1.0	2.4	7.1	1.0	1.4	20.2	3.5
28	1.6	4.0	3.6	1.2	1.4	2.3	12.8	4.0	9.4	1.4	6.4	1.0
29	2.9		1.3	1.5	3.8	1.1	1.1	.9	7.1	1.4	1.4	1.0
30	2.0		1.2	3.9	11.8	7.2	.9	3.1	2.1	5.9	63.5	1.0
31	2.0		1.2		4.5		.9	11.8		12.6		.9
Sum	180.8	97.3	203.9	169.6	119.9	76.7	88.0	149.7	88.3	193.3	361.1	113.8
Current Year 1969									Period 1935-1969			
Month	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	High	Day			Average	Maximum	Minimum		
Jan.	114.77	111.82	5	177	9	5.8	359	3,803	9,570	215		
Feb.	114.15	111.82	16	137	† 24	7	3.5	193	3,050	8,430	193	
Mar.	115.75	111.82	16	272	19	7	6.6	404	2,872	6,230	171	
Apr.	114.95	111.82	20	190	24	7	5.7	336	2,654	6,300	0	
May	112.80	111.83	30	58.0		1.8	3.9	238	3,202	9,320	101	
June	112.55	111.82	16	34.8	8	.7	2.6	152	3,025	7,440	130	
July	112.66	111.83	20	48.2	26	.8	2.8	175	3,066	8,320	133	
Aug.	115.45	111.80	3	236	7	.5	4.8	297	2,600	9,740	289	
Sept.	112.53	111.83	2	38.8	7	.8	2.9	175	1,911	6,140	133	
Oct.	115.50	111.85	12	241	16	1.0	6.2	383	2,593	5,680	372	
Nov.	116.14	111.80	15	331	19	.5	12.0	716	3,083	8,220	344	
Dec.	113.83	111.82	1	118	3	.7	3.7	226	4,086	9,430	164	
Yearly	116.14	111.80		331		0.5	5.1	3,654	35,945	82,900	2,944	

† And other days

COLORADO RIVER AT ELEVEN MILE GAGE - STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 4.3 miles downstream from northerly international boundary, 3.2 miles downstream from Morelos Diversion Dam, about 50 feet downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 11 miles downstream from Yuma, Arizona, along the river levee. Zero of gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 1969; once weekly readings obtained by the U. S. Bureau of Reclamation, January 1940 through October 1947.

REMARKS: This station is maintained by the United States Section of the Commission as part of the continuing study of channel conditions in the limitrophe section of the river.

EXTREMES: Since November 1947, maximum mean daily gage height, 108.20 feet on January 2, 1958; minimum mean daily gage height, 94.95 feet on June 22, 1968.

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	96.48	97.30	96.19	95.20	96.17	95.90	95.59	95.30	95.75	97.54	97.89	97.77
2	96.24	97.30	96.08	95.23	96.13	96.00	95.67	95.21	95.76	97.62	97.89	97.65
3	96.15	97.29	96.03	95.22	96.17	95.96	95.67	95.35	95.69	97.68	97.89	97.67
4	96.10	97.26	96.03	95.24	96.20	95.90	95.61	95.30	95.72	97.67	97.92	97.65
5	96.44	97.25	96.01	95.27	96.21	95.88	95.60	95.17	95.82	97.71	97.91	97.63
6	96.20	97.26	96.03	95.34	96.17	95.93	95.60	95.16	95.90	97.73	97.91	97.60
7	96.08	97.20	96.03	95.20	96.10	95.95	95.42	95.15	95.79	97.76	97.96	97.59
8	96.06	97.11	96.05	95.19	96.10	95.96	95.30	95.11	95.65	97.74	97.97	97.56
9	96.06	96.90	96.05	95.20	96.15	95.97	95.33	95.12	95.80	97.71	97.98	97.31
10	96.06	96.86	96.06	95.22	96.17	95.94	95.40	95.13	96.01	97.72	98.15	97.25
11	96.06	96.64	96.00	95.20	96.24	95.84	95.54	95.20	96.17	97.78	98.31	97.24
12	96.08	96.54	96.03	95.18	96.28	95.81	95.49	95.18	96.25	98.01	99.25	97.24
13	96.18	96.58	96.02	95.19	96.25	95.81	95.50	95.26	96.27	* 97.92	98.24	97.25
14	96.16	96.50	95.87	95.24	96.23	95.74	95.23	95.60	96.31	∩ 97.88	97.99	97.26
15	95.93	96.49	95.66	95.16	96.25	95.68	95.13	95.60	96.41	∩ 97.88	98.08	97.28
16	97.10	96.56	95.85	95.16	96.25	* 95.72	95.10	95.56	96.89	∩ 97.90	98.24	97.29
17	97.11	96.42	* 95.48	95.15	96.25	* 95.68	95.10	95.63	97.10	∩ 97.81	98.14	97.26
18	96.51	96.36	* 95.27	95.18	96.21	95.60	95.12	95.66	97.13	∩ 97.69	97.87	97.26
19	96.58	96.35	95.25	95.16	96.21	95.58	95.10	95.69	97.18	∩ 97.71	97.79	97.24
20	96.67	96.33	95.21	95.48	96.10	95.59	95.20	95.69	97.23	∩ 97.69	97.79	97.23
21	97.03	96.24	95.21	95.48	96.11	95.63	95.15	95.69	97.25	∩ 97.76	97.78	97.22
22	97.40	96.24	95.19	95.44	96.12	95.64	95.09	95.66	97.28	∩ 97.80	97.80	97.20
23	97.36	96.23	95.18	95.52	96.15	95.66	95.15	95.69	97.35	∩ 97.76	97.77	97.23
24	97.37	96.22	95.28	95.59	96.21	95.62	95.10	95.67	97.37	∩ 97.84	97.73	97.16
25	97.33	96.20	95.22	95.62	96.21	95.61	95.09	95.70	97.34	∩ 97.92	97.71	97.16
26	97.34	96.19	95.23	95.75	95.96	95.61	95.12	95.73	97.31	∩ 97.89	97.74	97.15
27	97.35	96.21	95.20	95.84	95.89	95.58	95.43	95.77	97.37	* 97.82	97.81	97.15
28	97.34	96.23	95.19	96.01	95.88	95.56	95.51	95.77	97.48	97.86	97.69	97.13
29	97.34		95.17	96.12	95.87	95.54	95.37	95.71	97.48	97.87	97.65	97.13
30	97.34		95.17	96.21	95.96	95.60	95.32	95.67	97.48	97.89	97.87	97.09
31	97.31		95.16		95.93		95.36	95.80		98.00		97.04
Avg.	96.67	96.65	95.63	95.40	96.13	95.75	95.34	95.48	96.62	* 97.79	97.96	97.32

* Partly estimated

∩ Estimated

TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona 18.5 miles downstream from the northerly international boundary, 17.4 miles downstream from Morelos Diversion Dam, and 2.2 miles upstream from the southerly international boundary. It is the farthest downstream of the three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1969, obtained by the United States Section; monthly discharge, March 1939 through 1950, by Bureau of Reclamation.

REMARKS: This wasteway was completed and flow began March 14, 1939. Since May 13, 1944, waste water from the West Main Canal which previously discharged across the southerly land boundary has been returned to the Colorado River through this wasteway.

EXTREMES: Prior to January 1951, maximum monthly discharge, 2,860 acre-feet, January 1946; minimum monthly discharge, 122 acre-feet in September 1950. Since January 1, 1951, maximum instantaneous discharge, 102 second-feet on January 24, 1954 at a maximum gage height of 95.46 feet (present datum); minimum instantaneous discharge, zero during a part of most months.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.3	1.2	9.0	3.2	1.0	5.2	0.2	12.9	0.2	0.2	3.6	21.6
2	4.3	.4	6.1	4.4	2.3	1.4	.2	1.0	.1	.4	9.5	3.7
3	12.2	.1	14.3	1.2	9.3	.1	2.4	1.9	.1	.2	1.1	1.1
4	2.1	.4	1.4	5.3	6.8	1.8	.8	15.7	1.4	.2	2.2	.6
5	17.1	3.0	.1	5.4	9.6	10.4	2.5	.9	4.4	.4	1.1	.5
6	16.2	4.6	.5	3.7	1.4	16.5	.4	.3	8.0	8.4	3.2	.8
7	.9	1.6	.6	1.2	.8	.8	.4	.3	5.9	2.5	.4	.9
8	.4	1.6	* 2.8	* 2.2	1.1	1.3	3.1	.3	1.7	3.2	7.7	.8
9	.2	8.7	‡ 1.5	* .2	3.3	* .6	4.9	2.0	.1	2.2	2.4	.4
10	.2	0	* .2	* .2	.7	* 2.3	.3	2.8	.1	7.1	3.6	.2
11	1.6	2.1	3.1	.8	1.1	.3	1.5	1.5	5.4	‡ 1.8	.4	.2
12	5.9	7.0	0	1.8	.2	1.6	2.6	1.5	8.0	‡ 7.2	1.5	1.3
13	2.9	.3	2.0	5.0	.2	1.5	.4	3.0	1.5	* 14.0	14.1	.2
14	.1	.5	2.8	5.5	4.9	.1	.2	1.1	.8	.7	8.4	.2
15	.3	2.2	2.5	4.4	1.6	.2	1.2	.5	1.7	.2	13.2	.3
16	.2	21.0	* 6.1	5.9	4.4	5.9	.5	3.2	1.0	.1	10.4	.2
17	.2	12.8	* 21.7	.2	.2	.7	3.4	3.8	2.5	3.5	11.2	.2
18	.2	.9	* 2.1	.2	1	2.1	2.5	2.6	5.9	4.9	1.6	.2
19	3.6	.3	* .9	2.4	1	2.9	2.0	4.7	9.4	11.9	.5	.1
20	3.0	.2	* .2	20.3	1.0	.5	1.6	.1	6.6	8.5	.3	1.2
21	1.2	3.8	.2	22.0	.2	.2	5.8	1.0	9.2	7.8	.2	0
22	.2	13.3	3.5	1.2	.4	.8	.8	2.9	17.0	6.1	.1	.1
23	0	.8	4.6	* .4	1.1	2.2	1.5	.1	7.6	2.7	3.5	.5
24	.2	1.0	2.5	* .3	5.1	1.3	.3	0	6.2	8.6	6.2	.3
25	0	1.4	0	* .2	6.7	3.4	5.7	.4	5.1	2.9	9.7	.2
26	3.4	1.2	* 0	.4	4.2	.6	1.5	.1	7.6	.9	6.0	.2
27	.4	4.4	* 1.6	.9	1.1	1.4	2.6	.1	7.2	.3	6.9	.1
28	.2	11.9	.1	10.6	.7	4.1	1.1	.1	2.1	1.5	3.8	.1
29	.2		2.8	4.9	1.2	.1	.2	.1	2.6	.1	11.3	0
30	0		.3	1.0	2.1	.1	2.5	1.2	.2	9.8	16.0	0
31	0		.2		4.7		14.1	1.9	3.7			6.7
Sum	78.7	106.7	93.7	115.4	73.6	70.4	67.2	68.0	129.6	122.0	160.1	42.9
Current Year 1969								Period 1939-1969				
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.	94.39	92.92	3	34.2	† 22	0	2.5	156	961	2,860	144	
Feb.	94.51	92.92	22	38.9	† 1	0	3.8	212	824	2,510	138	
Mar.	94.30	92.92	17	31.1	† 7	0	3.0	186	762	1,660	186	
Apr.	94.50	92.92	20	38.5	24	0	3.8	229	820	1,940	160	
May	94.60	92.92	3	42.5	14	0	2.4	146	1,002	2,470	59.3	
June	95.26	92.92	25	70.2	19	0	2.3	140	875	2,350	105	
July	94.22	92.94	31	28.2	6	.1	2.2	133	756	1,950	82.7	
Aug.	94.56	92.93	4	40.9	6	0	2.2	135	794	2,530	121	
Sept.	94.26	92.93	18	29.6	16	0	4.3	257	713	2,180	120	
Oct.	94.67	92.93	30	45.3	16	0	3.9	242	859	2,100	217	
Nov.	94.38	92.92	29	33.8	4	0	5.3	318	991	2,380	191	
Dec.	94.30	92.92	1	31.0	† 21	0	1.4	85.1	1,106	2,680	85.1	
Yearly	95.26	92.92		70.2		0	3.1	2,239	10,463	24,370	1,928	

* Partly estimated ‡ Estimated † And other days

DIVERSIONS BY PUMPS IN THE UNITED STATES - LIMITROPHE SECTION

DESCRIPTION: One privately operated pump located on the left bank of the Colorado River in the limitrophe section pumps water for irrigating land in the river floodway in the United States.

RECORDS: Quantities of water pumped are estimated by the United States Section of the Commission from weekly readings of a running time meter attached to the pump, and pump capacity. Records available: January 1956 through 1969.

REMARKS: These records are used in the computations of water delivered to Mexico.

Mean Daily Discharge in Second-Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	6.6	0	0	0	0	3.3	0	0	0	0
3	0	0	4.5	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	6.3	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	4.2	0	0	4.8	0	0
13	0	0	0	3.9	0	0	3.0	0	0	4.8	0	0
14	0	0	0	5.4	2.7	0	0	0	0	2.7	0	0
15	0	0	0	0	1.5	0	0	0	0	0	0	0
16	0	6.6	6.3	0	0	0	0	0	0	0	0	0
17	0	7.2	7.2	0	0	0	0	0	0	0	0	0
18	0	0	2.7	0	0	4.8	3.0	0	0	0	0	0
19	0	0	0	1.5	0	3.0	1.8	0	0	0	0	0
20	0	0	0	7.2	0	0	0	0	0	0	0	0
21	0	0	0	5.4	0	0	0	0	0	0	0	0
22	0	6.9	0	0	0	0	2.4	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	1.5	0	0	0	1.2	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	3.6	0	0	5.7	0	0	0	0	0	0	0
27	0	1.5	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	3.0	0	0	0	0	0	0
30	0	0	0	0	5.1	0	0	0	0	0	0	0
31	0	0	0	0	7.2	0	.3	0	0	0	0	0
Sum	0	27.3	27.3	23.4	22.2	12.0	14.7	9.6	0	12.3	0	0
Current Year 1969								Period 1956-1969				
Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet			
	High	Low	Day	High		Day			Low	Average	Maximum	Minimum
				Day	Day							
Jan.				0		0	0	135	280	0		
Feb.			17	7.2	† 1	0	1.0	54.1	239	500	26.2	
Mar.			17	7.2	† 1	0	.9	54.1	298	600	11.3	
Apr.			20	7.2	† 1	0	.8	46.4	377	670	36.3	
May			31	7.2	† 1	0	.7	44.0	419	770	44.0	
June			18	4.8	† 1	0	.4	23.8	440	800	0	
July			12	4.2	† 1	0	.5	29.2	452	820	29.2	
Aug.			4	6.3	† 1	0	.3	19.0	301	800	0	
Sept.				0		0	0	0	284	940	0	
Oct.			† 12	4.8	† 1	0	.4	24.4	198	390	0	
Nov.				0		0	0	0	156	330	0	
Dec.				0		0	0	0	111	230	0	
Yearly				7.2		0	.4	295	3,410	6,480	295	

Ø Mean daily

† And other days

EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 300 feet north of the international boundary near San Luis, Arizona, and 1.5 miles east of the Colorado River.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning November 1, 1953, from head on control weir as measured by water-stage recorder and weir ratings as determined by current meter measurements. Records available: October 1946 through 1969. Records of monthly discharges also are available for the periods January 1924 through June 1928, January 1932 through 1933, and April 1935 through September 1946.

REMARKS: Wasteway discharges from the East Main Canal comprise regulatory waste and drainage waters from the eastern half of the Valley Division of the Yuma Project and are considered as part of the volumes arriving at the limitrophe section of the Colorado River.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
1	2.1	3.9	15.6	11.1	11.2	3.1	6.5	3.6	5.9	10.1	12.6	7.5		
2	.8	2.3	21.6	8.2	6.8	8.2	4.6	11.9	3.3	.1	10.5	5.0		
3	.6	4.5	12.2	12.6	21.6	11.6	7.6	13.3	4.2	0	16.0	18.6		
4	3.2	7.0	17.3	1.0	9.3	5.4	.1	11.5	.4	16.6	10.6	21.5		
5	11.7	13.4	2.8	2.5	17.8	.6	2.5	.8	3.6	10.3	7.2	2.1		
6	7.0	8.8	.6	15.3	8.8	.7	3.1	4.3	8.9	5.7	8.7	2.6		
7	5.1	9.2	4.5	4.6	12.5	6.1	8.1	1.7	13.6	5.7	.1	.3		
8	1.0	4.2	2.2	3.7	12.3	6.1	10.9	.5	0	15.1	0	.1		
9	.1	5.5	10.1	3.3	3.8	1.0	2.6	7.8	1.0	17.7	3.6	.7		
10	1.7	8.3	8.6	.1	16.4	15.8	5.0	9.1	20.0	13.0	25.9	3.1		
11	6.7	4.0	17.9	0	5.7	22.8	16.6	6.9	10.2	8.4	15.7	7.8		
12	9.9	.3	5.9	2.6	6.1	7.7	12.6	3.4	10.2	16.6	7.8	21.9		
13	11.6	3.0	4.2	0	8.7	4.3	9.8	4.3	5.2	20.5	.9	15.8		
14	11.5	.4	4.3	* 1.6	15.2	.4	12.3	6.7	11.1	4.0	2.6	20.8		
15	14.1	6.9	11.6	* 10.9	13.2	4.0	18.2	9.4	11.5	0	22.1	6.3		
16	11.2	3.3	10.7	16.0	14.0	1.9	2.4	6.1	4.2	5.9	26.7	4.9		
17	1.2	11.9	.4	5.1	5.4	13.6	13.1	.3	5.6	19.5	21.9	1.2		
18	1.0	10.1	1.1	15.9	12.3	3.0	8.8	6.8	4.2	10.6	5.8	1.3		
19	7.4	6.2	1.4	10.6	5.6	0	.6	5.9	13.1	1.9	1.4	9.9		
20	14.1	14.2	.2	4.4	1.8	1.2	10.0	2.2	17.9	1.6	.4	2.8		
21	3.6	7.1	.8	11.2	0	6.1	11.7	.4	19.6	16.9	0	3.4		
22	7.0	2.2	.3	9.9	.6	7.2	4.5	10.4	12.1	14.4	9.0	8.6		
23	6.6	.6	0	6.9	4.9	5.3	0	3.4	18.5	7.0	9.0	5.2		
24	3.3	2.7	3.6	17.3	2.0	4.2	6.5	7.2	6.9	19.2	7.7	1.8		
25	3.7	15.1	5.7	12.8	6.2	5.5	14.0	9.4	8.1	7.1	2.5	4.6		
26	2.3	10.8	0	1.6	11.3	.1	15.1	6.2	5.2	4.8	.8	8.4		
27	9.5	10.8	4.6	.1	12.0	1.4	11.4	.5	23.2	28.4	0	3.0		
28	3.0	16.5	9.7	.1	6.8	2.1	7.4	3.3	17.0	7.9	7.8	10.3		
29	1.5		3.7	3.2	2.0	17.5	2.3	11.9	8.8	.3	6.2	7.8		
30	5.3		14.3	3.7	.5	13.2	4.8	6.2	13.2	0	10.9	.8		
31	2.2		19.1		0		4.5	17.0		5.5		11.9		
Sum	170.0	193.2	215.0	196.3	254.8	180.1	237.6	192.4	286.7	294.8	254.4	220.0		
Current Year 1969												Period 1935-1969		
Month	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet						
	High	Low	Day	High	Low			Average	Maximum	Minimum				
Jan.	90.78	90.15	5	28.5	† 3	0	5.5	337	1,300	3,360	335			
Feb.	91.06	90.15	13	52.9	† 2	0	6.9	383	1,084	3,170	304			
Mar.	91.12	90.15	7	66.2	† 5	0	6.9	426	1,259	2,920	190			
Apr.	90.99	90.15	12	52.5	† 3	0	6.5	389	1,228	3,170	197			
May	91.10	90.15	† 10	64.0	† 9	0	8.2	505	1,352	3,040	302			
June	91.03	90.15	28	56.6	† 1	0	6.0	357	1,147	3,660	175			
July	90.89	90.15	8	42.6	† 2	0	7.7	471	1,241	3,590	182			
Aug.	90.80	90.15	31	34.0	† 5	0	6.2	382	1,258	3,960	169			
Sept.	90.80	90.15	† 8	34.0	† 4	0	9.6	569	1,151	3,170	159			
Oct.	91.17	90.15	27	71.7	† 2	0	9.5	585	1,205	3,280	432			
Nov.	90.86	90.15	10	39.7	† 7	0	8.5	505	1,325	3,570	313			
Dec.	91.02	90.15	22	55.6	† 7	0	7.1	436	1,303	3,080	364			
Yearly	91.17	90.15		71.7		0	7.4	5,345	14,853	38,310	4,448			

† And other days

* Partly estimated

YUMA MAIN DRAIN (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorders located in the forebay and afterbay, with flow meters in the four discharge pipes at the Boundary Pumping Plant on the Main Drain about 200 feet north of the international boundary near San Luis, Arizona, 1.3 miles east of the Colorado River.

RECORDS: Main Drain discharges are lifted 10 to 12 feet at the pumping plant. Prior to April 1, 1969 discharges were computed from pump ratings and the differential head measured by the two gages. Beginning April 1, 1969 discharges were computed from flow meter charts. Pump ratings and flow meter discharges are checked by current meter measurements. During the year, 42 measurements were made by the United States Section of the Commission. Records obtained and computed by the United States Section of the Commission. Records available: Monthly discharges June 1919 through 1951; daily discharges January 1952 through 1969.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. Both the Main Drain and the East Main Canal Wasteway discharge into Mexico at the international land boundary near San Luis, Sonora. The water is used for irrigation in Mexico on the left (Sonora) bank of the Colorado River and is considered as part of the volumes arriving at the limitrophe section of the river.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	145	145	160	184	195	207	176	188	178	198	201	170
2	149	146	171	178	194	201	182	190	183	195	200	172
3	145	146	165	178	191	206	193	193	174	197	184	199
4	145	149	162	191	194	204	193	199	182	197	187	184
5	151	145	152	187	184	205	185	191	180	186	175	167
6	165	143	161	178	181	203	183	178	158	192	186	170
7	152	143	165	173	190	211	188	186	178	200	193	161
8	145	136	171	187	202	204	190	184	188	193	182	162
9	142	139	167	183	189	195	184	191	195	197	196	167
10	132	143	172	185	193	184	200	193	186	199	217	161
11	145	145	167	189	196	193	193	184	181	197	196	161
12	141	154	156	197	189	189	190	187	179	200	176	165
13	149	148	141	197	189	188	189	182	178	184	191	174
14	146	159	161	199	194	193	189	185	170	189	187	170
15	145	155	166	185	190	190	190	189	184	185	187	170
16	143	164	160	193	203	178	186	190	178	198	192	158
17	143	165	162	201	199	182	190	192	181	190	186	158
18	143	165	164	198	200	185	183	192	190	185	167	158
19	143	158	141	199	194	179	202	180	182	183	169	159
20	152	165	172	206	194	187	193	178	186	184	166	163
21	144	158	155	199	195	179	194	172	190	180	170	171
22	151	163	157	198	195	182	189	179	184	173	173	171
23	144	161	161	195	195	187	186	176	192	193	177	179
24	146	154	159	197	193	189	195	180	183	197	172	170
25	153	157	156	183	194	179	189	200	196	196	172	171
26	145	157	161	177	195	183	190	187	187	210	172	168
27	144	159	158	180	191	179	193	189	185	203	172	160
28	141	161	162	180	189	183	187	188	189	201	171	163
29	137		159	192	196	192	188	190	184	185	169	163
30	144		156	190	205	197	183	185	187	181	172	158
31	139		165		195		190	199		185		140
Sum	4,509	4,283	4,985	5,679	6,004	5,734	5,863	5,797	5,488	5,953	5,458	5,163
Current Year 1969										Period 1935-1969		
Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Low	Average			Maximum	Minimum		
Jan.			6	165	10	132	145	8,943	7,693	11,203	1,740	
Feb.			†17	165	8	136	153	8,495	7,637	11,988	1,640	
Mar.			†10	172	†13	141	161	9,888	8,744	12,430	1,940	
Apr.			20	206	7	173	189	11,264	8,495	11,890	1,920	
May			30	205	6	181	194	11,909	8,625	13,140	1,950	
June			7	211	16	178	191	11,373	7,950	12,040	2,290	
July			19	202	1	176	189	11,629	7,724	11,830	2,530	
Aug.			25	200	21	172	187	11,498	7,653	11,960	2,560	
Sept.			25	196	6	158	183	10,885	7,691	11,560	2,280	
Oct.			26	210	22	173	192	11,808	8,752	12,385	2,940	
Nov.			10	217	20	166	182	10,826	8,525	12,010	2,800	
Dec.			3	199	31	140	167	10,241	8,235	11,480	2,450	
Yearly				217		132	178	128,759	97,724	139,380	27,040	

ø Mean daily † And other days

TOTAL FLOWS CROSSING INTERNATIONAL BOUNDARY INTO MEXICO NEAR SAN LUIS, SONORA

DESCRIPTION: The tabulated data below are the combined flows of the East Main Canal Wasteway and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sánchez Mejorada Canal near San Luis, Arizona. The Mexican Section maintains a water-stage recorder in Mexico on right bank of Sánchez Mejorada Canal and obtains check measurements on a bridge located 0.2 mile downstream from the international boundary, 1.2 miles east of the Colorado River and 0.6 mile west of San Luis, Sonora.

RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: January 1935 through 1969.

REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway and the Yuma Main Drain, are published separately in this bulletin on pages 30 and 31.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	147	149	175	195	206	210	182	192	184	208	214	177
2	150	148	193	186	201	209	187	202	186	195	210	177
3	146	151	177	190	213	218	201	206	178	197	200	218
4	148	156	179	192	203	209	193	211	182	214	197	205
5	163	158	155	189	202	206	187	192	184	196	182	169
6	172	152	162	193	190	204	186	182	167	198	195	173
7	157	152	169	178	202	217	196	188	192	206	193	161
8	146	140	173	191	214	210	201	185	188	208	182	162
9	142	145	177	186	193	196	187	199	196	215	199	168
10	134	151	181	185	209	200	205	202	206	212	243	164
11	152	149	185	189	202	216	210	191	191	205	212	169
12	151	154	162	200	195	197	203	191	189	217	184	187
13	161	151	145	197	198	192	199	186	183	204	192	190
14	157	159	165	201	209	193	201	192	181	193	190	191
15	159	162	178	196	203	194	208	198	196	185	209	176
16	154	167	171	209	217	180	188	196	182	204	219	163
17	144	177	162	206	204	196	203	192	187	210	208	159
18	144	175	165	214	212	188	192	199	194	196	173	159
19	150	164	142	210	200	179	203	186	195	185	170	169
20	166	179	172	210	196	188	203	180	204	186	166	166
21	148	165	156	210	195	185	206	172	210	197	170	174
22	158	165	157	208	196	189	194	189	196	187	182	180
23	151	162	161	202	200	192	186	179	211	200	186	184
24	149	157	163	214	195	193	202	187	190	216	180	172
25	157	172	162	196	200	185	203	209	204	203	174	176
26	147	168	161	179	206	183	205	193	192	215	173	176
27	154	170	163	180	203	180	204	190	208	231	172	163
28	144	178	172	180	196	185	194	191	206	209	179	173
29	138	163	195	198	210	190	190	202	193	185	175	171
30	149	170	194	206	210	188	191	200	181	183	159	159
31	141	184	184	195	195	194	194	216	190	190	152	152
Sum	4,679	4,476	5,200	5,875	6,259	5,914	6,101	5,989	5,775	6,248	5,712	5,383
Current Year 1969										Period 1935-1969		
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.			6	172	10	134	150	9,280	8,993	12,131	* 2,123	
Feb.			2	179	8	140	160	8,878	8,721	12,970	* 2,023	
Mar.			2	193	19	142	168	10,314	10,003	13,704	* 2,322	
Apr.			†18	214	7	178	196	11,653	9,723	12,982	2,117	
May			16	217	6	190	202	12,414	9,977	13,900	2,473	
June			3	218	19	179	197	11,730	9,097	12,570	2,525	
July			11	210	1	182	197	12,100	8,965	12,420	2,927	
Aug.			31	216	21	172	193	11,880	8,911	12,657	2,989	
Sept.			†21	210	6	167	193	11,454	8,842	12,450	2,602	
Oct.			27	231	30	181	202	12,393	9,957	13,898	3,444	
Nov.			10	243	20	166	190	11,331	9,850	12,712	3,407	
Dec.			3	218	31	152	174	10,677	9,538	12,050	2,888	
Yearly				243		134	185	134,104	112,577	149,010	31,840	

∅ Mean daily † And other days * Partly estimated

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder located in Mexico on the right bank of the river about 1,000 feet upstream from the southerly international boundary, 2 miles west of San Luis, Arizona, and 19.4 miles downstream from Morelos Dam. Zero of gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Records obtained and furnished by the United States Section of the Commission. Computations by shifting control methods. Records available: Daily discharges, January 1950 through 1969; continuous record of gage heights, January 1947 through 1969. Monthly flows for this station have been derived for the period January 1935 through December 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured monthly flows from the wasteways discharging into the boundary section of the river from the Yuma Project in Arizona.

REMARKS: Reservoirs, diversions in the United States and Mexico, drainage returns, and waste flows modify the river flow at this station.

EXTREMES: Since January 1950: Maximum instantaneous discharge, 28,610 second-feet on December 18, 1952; maximum gage height, 84.84 feet on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	157	253	136	9.0	112	65.6	21.2	5.9	18.4	180	248	321
2	126	253	119	12.8	102	63.8	25.1	.2	15.2	188	246	277
3	116	253	111	12.8	108	74.0	31.4	0	12.8	196	243	267
4	99.7	252	103	14.0	106	71.0	30.0	4.3	9.5	202	244	267
5	99.7	252	97.5	18.8	119	71.0	27.2	.4	12.2	202	246	264
6	145	257	97.5	18.8	108	80.9	* 25.8	0	25.1	209	246	261
7	102	256	97.5	20.0	104	69.2	† 23.7	0	28.6	213	246	264
8	89.8	251	97.5	12.2	92.0	72.0	* 16.4	0	16.9	217	255	261
9	86.5	243	103	10.5	97.5	71.0	† 10.0	0	5.6	210	267	252
10	85.4	209	102	10.0	101	68.3	5.5	0	11.8	211	288	202
11	85.4	200	94.2	10.0	104	62.9	7.0	0	38.2	209	276	197
12	92.0	173	86.5	6.5	115	54.8	11.6	0	56.6	220	330	205
13	95.3	163	85.4	9.0	115	54.8	10.0	0	61.1	264	472	215
14	102	160	81.0	7.5	113	52.2	6.5	0	62.0	234	339	221
15	99.7	158	66.5	12.2	113	47.4	0.2	0	65.6	224	294	223
16	95.1	173	49.0	12.8	115	44.2	0	0	79.4	224	329	226
17	206	183	80.1	9.0	116	48.2	0	0	132	225	322	229
18	183	140	46.4	8.0	114	42.6	0	1.8	164	213	312	226
19	151	133	29.3	8.0	110	37.8	0	8.1	176	199	270	229
20	156	133	25.8	13.2	103	34.2	0	11.6	188	210	255	229
21	172	127	23.7	54.4	93.1	33.5	0	14.0	188	200	264	229
22	213	131	21.2	29.2	97.5	33.5	0	17.0	199	216	267	221
23	242	115	24.4	29.3	102	33.5	0	* 15.8	197	211	267	215
24	247	115	20.0	32.8	108	30.0	0	† 15.2	196	218	273	218
25	252	118	21.2	38.6	113	31.4	0	† 15.2	197	229	267	215
26	255	116	18.2	41.8	113	28.6	0	* 12.8	188	236	267	215
27	257	114	19.4	53.9	80.0	28.6	0	13.4	186	230	279	212
28	253	125	16.4	69.2	76.0	23.7	0	14.0	185	222	282	212
29	252	125	15.8	94.2	69.2	21.2	0	15.8	190	200	276	210
30	250	122	101	73.0	17.0	0	0	12.8	182	232	282	207
31	253	10.0	10.0	74.0	0	0	0	11.4	182	236	282	202
Sum	5,018.6	5,056	1,910.7	779.5	3,166.3	1,466.9	251.6	189.7	3,087.0	6,703	8,452	7,192
Current Year 1969										Period 1935-1969		
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.	76.70	74.93	26	258	16	68.3	162	9,954	463,750	1,672,000	1,821	
Feb.	76.77	75.75	6	260	27	114	181	10,028	363,505	1,385,000	2,040	
Mar.	75.99	74.30	1	143	31	9.5	61.6	3,790	292,075	1,127,000	1,493	
Apr.	75.37	74.11	30	107	14	2.5	26.0	1,546	186,445	700,900	977	
May	75.49	74.91	† 5	122	29	66.5	102	6,280	256,003	1,160,000	1,045	
June	75.15	74.31	6	90.9	30	15.2	48.9	2,910	196,922	1,180,000	143	
July	74.57	73.90	3	32.1	† 15	0	8.1	499	143,878	772,800	0	
Aug.	74.38	73.90	22	18.2	† 1	0	6.1	376	160,253	796,000	0	
Sept.	76.03	73.98	22	203	9	1.0	103	6,123	194,372	1,033,000	0	
Oct.	76.80	75.85	13	275	1	180	216	13,295	248,210	1,192,000	9,120	
Nov.	76.79	75.98	13	502	5	240	282	16,764	326,809	1,428,000	7,180	
Dec.	76.38	75.96	1	332	† 10	197	232	14,265	412,236	1,839,000	2,320	
Yearly	76.80	73.90		502		0	119	85,830	3,217,458	10,688,800	93,418	

* Partly estimated † Estimated ‡ And other days

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page For Description)

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	75.73	76.69	75.93	74.29	75.40	74.90	74.41	74.13	74.37	75.85	76.04	76.33
2	75.46	76.69	75.79	74.35	75.31	74.88	74.47	73.92	74.31	75.90	76.01	76.24
3	75.38	76.69	75.72	74.35	75.37	74.99	74.56	73.90	74.26	75.96	75.99	76.22
4	75.22	76.69	75.66	74.37	75.35	74.96	74.54	74.04	74.19	76.00	76.00	76.22
5	75.22	76.70	75.61	74.45	75.46	74.96	74.50	73.92	74.24	76.00	76.04	76.21
6	75.62	76.75	75.61	74.45	75.36	75.06	* 74.48	73.90	74.47	76.05	76.05	76.20
7	75.24	76.74	75.61	74.47	75.31	74.94	u 74.45	73.90	74.52	76.08	76.05	76.21
8	75.14	76.69	75.61	74.33	75.19	74.97	* 74.34	73.90	74.33	76.12	76.09	76.20
9	75.11	76.63	75.66	74.29	75.23	74.96	74.24	73.90	74.10	76.07	76.13	76.17
10	75.10	76.38	75.65	74.26	75.26	74.93	74.15	73.90	74.23	76.08	76.21	75.99
11	75.10	76.32	75.58	74.26	75.29	74.88	74.18	73.90	74.56	76.06	76.18	75.96
12	75.15	76.14	75.50	74.19	75.39	74.80	74.27	73.90	74.75	76.16	76.36	75.98
13	75.18	76.08	75.49	74.24	75.39	74.80	74.24	73.90	74.79	76.52	76.71	76.01
14	75.24	76.06	75.44	74.21	75.37	74.77	74.16	73.90	74.80	76.28	76.31	76.03
15	75.22	76.04	75.27	74.30	75.37	74.71	73.92	73.90	74.84	76.20	76.17	76.04
16	75.18	76.14	75.04	74.31	75.39	74.67	73.90	73.90	74.97	76.20	76.28	76.05
17	76.19	76.21	75.42	74.24	75.40	74.73	73.90	73.90	75.44	76.21	76.26	76.06
18	75.97	75.96	74.99	74.22	75.38	74.67	73.90	73.98	75.70	76.11	76.23	76.05
19	75.67	75.90	74.73	74.22	75.34	74.62	73.90	74.17	75.79	76.00	76.09	76.06
20	75.72	75.90	74.66	74.30	75.27	74.57	73.90	74.26	75.90	76.10	76.04	76.06
21	75.86	75.85	74.62	74.84	75.18	74.56	73.90	74.31	75.90	76.01	76.07	76.06
22	76.25	75.88	74.56	74.53	75.21	74.56	73.90	74.36	76.00	76.14	76.08	76.04
23	76.50	75.76	74.59	74.53	75.25	74.56	73.90	* 74.34	75.99	76.11	76.08	76.03
24	76.55	75.76	74.51	74.58	75.31	74.52	73.90	u 74.33	75.98	76.16	76.10	76.04
25	76.59	75.78	74.51	74.65	75.35	74.54	73.90	u 74.33	75.99	76.24	76.09	76.03
26	76.61	75.77	74.45	74.69	75.35	74.50	73.90	* 74.29	75.91	76.30	76.09	76.03
27	76.63	75.75	74.47	74.84	75.05	74.50	73.90	74.30	75.90	76.24	76.14	76.02
28	76.62	75.84	74.42	75.01	75.01	74.44	73.90	74.31	75.89	76.34	76.15	76.02
29	76.65		74.41	75.25	74.94	74.40	73.90	74.34	75.93	76.68	76.14	76.00
30	76.66		74.35	75.31	74.98	74.34	73.90	74.28	75.87	76.35	76.16	75.99
31	76.69		74.31	74.99	74.99		73.90	74.26		76.08		75.97
Avg.	75.79	76.21	75.10	74.48	75.27	74.72	74.11	74.08	75.13	76.15	76.14	76.08

* Partly estimated u Estimated

WASTEWAY TO COLORADO RIVER AT KILOMETER 27 IN MEXICO

DESCRIPTION: Water-stage recorder and cableway located on the left bank of the Canal de Conexión wasteway, immediately upstream from where it discharges into the Colorado River, 0.6 mile downstream from the wasteway gates on Canal de Conexión, 16.8 miles downstream from Morelos Dam, and 0.2 mile south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

RECORDS: Data obtained and computed by the Colorado River Irrigation District of the Ministry of Hydraulic Resources and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. 1969 records good. Records available: April 1956 through 1969.

REMARKS: The Colorado River Irrigation District transports water for irrigation of land on the left bank of the Colorado River by the Canal de Conexión to a point called Kilometer 27. At this point, flows may be returned to the river through the wasteway or diverted to the Bacanora-Monumentos Canal system through the Sánchez Mejorada Siphon, which was placed in operation on June 28, 1963.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1956-1969		
		Average	Maximum	Minimum
January	0	7,215	69,527	0
February	0	1,451	8,679	0
March	0	8,397	35,492	0
April	0	18,905	68,714	0
May	0	8,157	22,072	0
June	0	13,025	28,915	0
July	0	20,434	46,139	0
August	0	22,078	55,497	0
September	0	13,321	37,194	0
October	0	4,822	20,512	0
November	0	11,319	69,415	0
December	0	7,182	70,213	0
Yearly	0	129,375	346,339	0

WASTEWAY TO COLORADO RIVER AT COLONIA ELIAS IN MEXICO

DESCRIPTION: Wasteway structure located at Kilometer 7+570 of the Barrote Canal on the right bank of the Colorado River in Colonia Elias about 20.5 miles downstream from the southerly international boundary and the town of San Luis Río Colorado, Sonora; about 10 miles upstream from the Sonora-Baja California railroad bridge and 4.3 miles upstream from the Miguel C. Rodríguez Gaging Station. The wasteway gates are located about 2,500 feet from the right bank of the Colorado River.

RECORDS: Data obtained by the Ministry of Hydraulic Resources and furnished by the Mexican Section of the Commission are based on gate openings. Records available: January 1957 through 1969.

REMARKS: The wasteway structure has 3 manually operated rectangular gates which discharge directly from the Barrote Canal into a wasteway leading to the Colorado River.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1957-1969		
		Average	Maximum	Minimum
January	0	607	3,201	0
February	0	400	4,097	0
March	0	639	6,850	0
April	0	493	3,707	0
May	0	112	1,163	0
June	0	58.3	625	0
July	0	331	4,296	0
August	0	318	1,926	0
September	0	383	1,548	0
October	0	114	791	0
November	0	275	1,891	0
December	0	338	3,047	0
Yearly	0	4,068	13,429	0

COLORADO RIVER AT MIGUEL C. RODRIGUEZ IN MEXICO - DISCHARGES

DESCRIPTION: Water-stage recorder and cableway located in Mexico on the left bank of the Colorado River about 24.5 miles downstream from the southerly international boundary, 44.5 miles downstream from Morelos Dam, and 4.5 miles upstream from the Sonora-Baja California railroad bridge. Zero of gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on 30 current meter measurements made during the year and a continuous record of gage heights. Data obtained and furnished by the Mexican Section of the Commission. From June 1951 to July 1954, discharges were computed from gage height records based on daily gage readings at 8:00 a.m., Pacific Standard Time. A continuous record of gage heights obtained since July 21, 1954. Records available: June 1951 through 1969.

REMARKS: Diversions and return flows modify the flow of the river at this station. On many occasions the flow at this station consists solely of seepage from canals which run parallel and adjacent to the river at a higher elevation.

EXTREMES: Since January 1, 1952: Maximum mean daily gage height, 53.28 feet on January 4, 1958 with a discharge of 18,500 second-feet; minimum mean daily gage height, 37.86 feet on June 11, 1965 with a discharge of 1.4 second-feet; maximum mean daily discharge, 20,200 second-feet on December 19, 1952 with a gage height of 52.30 feet; minimum mean daily discharge, no flow on various occasions.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	89.3	135	46.6	11.7	6.4	9.9	9.2	13.4	18.7	18.0	169	147
2	113	138	46.6	11.7	7.8	9.9	9.2	13.4	18.7	18.0	172	154
3	43.8	135	46.6	10.9	8.1	9.9	9.2	13.4	18.0	18.0	172	164
4	37.8	138	42.0	10.9	7.1	9.9	10.9	13.4	19.1	20.5	172	157
5	31.4	138	39.9	9.9	7.8	9.9	10.9	13.4	19.4	23.7	171	150
6	25.4	135	37.4	10.9	7.1	9.9	10.9	14.1	20.1	23.7	172	143
7	31.4	135	33.2	9.2	7.1	9.9	10.9	14.5	20.1	23.7	174	141
8	31.4	138	33.2	8.1	7.1	9.9	10.9	14.5	20.1	23.7	174	143
9	16.6	135	37.4	8.1	7.1	10.9	10.9	14.5	20.5	23.7	180	143
10	11.3	131	33.2	8.1	6.7	10.9	10.9	14.5	20.5	23.7	197	138
11	8.5	119	33.2	7.8	7.8	10.9	10.9	14.5	20.5	23.7	197	121
12	8.5	113	31.4	8.1	8.1	11.7	10.9	14.8	20.8	23.7	197	107
13	8.5	97.8	25.4	9.2	8.1	11.7	12.7	15.2	20.8	23.7	204	107
14	11.3	86.5	22.2	9.2	8.1	11.7	12.7	14.8	20.8	23.7	224	111
15	16.6	81.2	22.2	9.2	8.1	11.7	12.7	15.2	20.8	30.7	228	111
16	16.6	75.9	20.5	9.2	8.1	11.7	12.7	15.2	20.8	45.9	204	111
17	11.3	75.9	17.3	9.2	8.1	12.7	12.7	15.5	20.8	66.4	203	113
18	43.8	81.2	14.8	9.2	7.8	12.7	12.7	15.5	20.8	93.6	206	115
19	82.6	75.9	16.2	9.2	6.4	12.7	12.7	15.9	20.8	105	201	113
20	66.0	65.7	13.8	9.2	6.4	12.7	14.1	15.9	20.8	99.2	164	111
21	62.9	63.2	13.8	9.2	6.4	12.7	14.1	15.9	20.8	105	134	113
22	66.0	60.7	13.8	8.1	6.4	12.7	14.1	16.2	20.8	99.2	134	113
23	89.3	56.2	13.8	8.1	7.1	12.7	14.1	15.5	20.8	124	129	111
24	113	53.7	12.4	8.1	7.8	12.7	15.9	15.9	20.8	162	124	109
25	124	51.6	12.4	8.1	8.1	12.7	15.9	16.6	20.8	155	124	111
26	131	47.0	12.4	8.1	9.2	14.1	15.9	16.6	20.8	159	124	107
27	134	44.8	12.4	8.1	8.1	14.1	17.7	17.0	21.2	164	124	105
28	134	47.0	12.4	8.1	8.1	14.1	17.7	16.6	21.2	166	124	105
29	138	12.4	12.4	8.1	9.2	14.1	17.7	16.2	20.5	160	118	101
30	138	12.4	12.4	7.1	9.9	14.1	17.7	17.3	19.4	155	113	101
31	138	11.3	11.3	9.2	9.2	15.9	15.9	18.0	19.4	164	101	103
Sum	1,973.3	2,654.3	752.6	270.1	238.8	355.2	405.4	473.4	610.0	2,365.5	5,029	3,779
Current Year 1969									Period June 1951-1969			
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.	39.93	38.55	31	141	† 11	5.7	63.6	3,914	267,174	1,047,887	426	
Feb.	39.93	38.81	† 2	138	† 27	44.8	94.6	5,261	167,999	696,461	317	
Mar.	38.88	38.19	† 2	49.1	† 25	11.3	24.4	1,493	117,854	807,342	0	
Apr.	38.19	37.96	† 1	11.7	30	6.7	9.2	536	77,796	588,983	0	
May	38.12	37.93	30	9.9	† 1	6.4	7.8	473	108,345	732,815	0	
June	38.25	38.12	† 26	14.1	† 1	9.9	12.0	705	46,823	555,460	0	
July	38.42	38.25	† 27	17.7	† 1	9.2	13.1	805	25,186	264,561	0	
Aug.	38.91	38.32	31	18.7	4	13.4	16.6	940	37,348	309,320	0	
Sept.	39.14	38.85	† 27	21.2	3	18.0	20.5	1,211	58,404	572,551	0	
Oct.	40.55	38.94	24	174	3	17.7	76.3	4,689	95,932	769,939	2,459	
Nov.	41.47	40.42	15	228	† 29	113	167	9,971	159,588	909,399	6,067	
Dec.	40.85	37.93	3	166	† 29	101	122	7,495	215,809	1,060,767	687	
Yearly	41.47	37.93		228		5.7	52.3	37,491	1,341,709	7,923,600	34,412	

† And other days

COLORADO RIVER AT MIGUEL C. RODRIGUEZ IN MEXICO - STAGES

(See Preceding Page For Description)

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	39.44	39.90	38.85	38.19	37.93	38.12	38.25	38.35	38.91	38.98	40.45	40.58
2	39.67	39.93	38.85	38.19	38.02	38.12	38.25	38.35	38.91	38.98	40.52	40.68
3	38.98	39.90	38.85	38.16	38.06	38.12	38.25	38.32	38.85	38.98	40.52	40.81
4	38.91	39.93	38.78	38.16	37.99	38.12	38.29	38.32	38.94	39.07	40.52	40.72
5	38.85	39.93	38.75	38.12	38.02	38.12	38.29	38.35	38.98	39.17	40.49	40.62
6	38.78	39.90	38.71	38.16	37.99	38.12	38.29	38.45	39.04	39.17	40.52	40.52
7	38.85	39.90	38.65	38.09	37.99	38.12	38.29	38.48	39.04	39.17	40.55	40.49
8	38.85	39.93	38.65	38.06	37.99	38.12	38.29	38.52	39.04	39.17	40.55	40.52
9	38.68	39.90	38.71	38.06	37.99	38.16	38.29	38.52	39.07	39.17	40.65	40.52
10	38.62	39.86	38.65	38.06	37.96	38.16	38.29	38.52	39.07	39.17	40.94	40.45
11	38.58	39.73	38.65	38.02	38.02	38.16	38.29	38.52	39.07	39.17	40.94	40.19
12	38.58	39.67	38.62	38.06	38.06	38.19	38.29	38.55	39.11	39.17	40.94	39.96
13	38.58	39.50	38.52	38.09	38.06	38.19	38.32	38.58	39.11	39.17	41.08	39.96
14	38.62	39.37	38.45	38.09	38.06	38.19	38.32	38.55	39.11	39.17	41.40	40.03
15	38.68	39.30	38.45	38.09	38.06	38.19	38.32	38.58	39.11	39.30	41.47	40.03
16	38.68	39.24	38.42	38.09	38.06	38.19	38.32	38.58	39.11	39.50	41.08	40.03
17	38.62	39.24	38.35	38.09	38.06	38.22	38.32	38.62	39.11	39.70	41.04	40.06
18	38.98	39.30	38.29	38.09	38.02	38.22	38.32	38.62	39.11	39.90	41.11	40.09
19	39.37	39.24	38.32	38.09	37.93	38.22	38.32	38.65	39.11	39.96	41.01	40.06
20	39.21	39.11	38.25	38.09	37.93	38.22	38.35	38.65	39.11	39.93	40.85	40.03
21	39.17	39.07	38.25	38.09	37.93	38.22	38.35	38.65	39.11	39.96	40.68	40.06
22	39.21	39.04	38.25	38.06	37.93	38.22	38.35	38.68	39.11	39.93	40.68	40.06
23	39.44	38.98	38.25	38.06	37.99	38.22	38.35	38.62	39.11	40.06	40.65	40.03
24	39.67	38.94	38.22	38.06	38.02	38.22	38.39	38.65	39.11	40.32	40.62	39.99
25	39.76	38.91	38.22	38.06	38.06	38.22	38.39	38.71	39.11	40.19	40.62	40.03
26	39.83	38.85	38.22	38.06	38.09	38.25	38.39	38.71	39.11	40.26	40.62	39.96
27	39.86	38.81	38.22	38.06	38.06	38.25	38.42	38.75	39.14	40.35	40.62	39.93
28	39.86	38.85	38.22	38.06	38.06	38.25	38.42	38.71	39.14	40.39	40.62	39.93
29	39.90		38.22	38.06	38.09	38.25	38.42	38.68	39.07	40.29	40.58	39.86
30	39.90		38.22	38.06	38.12	38.25	38.42	38.78	38.98	40.19	40.55	39.86
31	39.90		38.19	38.09	38.09		38.39	38.85		40.35		39.90
Avg.	39.17	39.44	38.45	38.09	38.02	38.19	38.32	38.58	39.07	39.63	40.75	40.19

WASTEWAY TO COLORADO RIVER AT UNION IN MEXICO

DESCRIPTION: Wasteway structure located at Kilometer 21+736 of the Barrote Canal in the Colonia Hidalgo about 1,500 feet from right bank of the Colorado River. The wasteway discharges into the Colorado River at a point about 0.6 mile upstream from the Sonora-Baja California railroad bridge and 30 miles downstream from the southerly international boundary.

RECORDS: Data obtained by the Ministry of Hydraulic Resources and furnished by the Mexican Section of the Commission are based on gate openings. Records available: January 1957 through 1969.

REMARKS: The wasteway structure has 3 manually operated rectangular gates which discharge from the Barrote Canal into a wasteway leading to the Colorado River.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1957-1969		
		Average	Maximum	Minimum
January	0	918	3,166	0
February	0	498	2,788	0
March	0	1,240	7,074	0
April	0	904	4,462	0
May	0	1,116	4,413	0
June	0	232	1,505	0
July	0	506	4,296	0
August	0	270	1,857	0
September	0	380	1,800	0
October	0	827	6,997	0
November	0	266	3,413	0
December	0	308	1,205	0
Yearly	0	7,464	24,526	0

COLORADO RIVER AT EL MARITIMO IN MEXICO - STAGES

DESCRIPTION: Water-stage recorder and cableway in Mexico, 47.6 miles downstream from the southerly international boundary, 18.6 miles downstream from the Sonora-Baja California railroad bridge and 3.7 miles east of Kilometer 70 of the Mexicali-San Felipe highway. The recorder is located on the right bank of the Colorado River. Zero of gage is 9.84 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Records obtained and computed by the Mexican Section of the Commission. Records available: Mean daily discharges from January 1960 through 1968. Incomplete record of gage heights, March 1, 1946 through November 1947; twice daily readings of gage heights, January 1, 1948 through December 1949; continuous record of gage heights since installation of water-stage recorder February 8, 1956. Mean daily gage heights, January 1960 through 1969.

REMARKS: In former years the flow past this station was affected by the tides in the Gulf of California. After July 1968, measurement by current meter was suspended; beginning in 1969, twice daily readings of gage heights and no record of mean daily discharges.

EXTREMES: January 1960 through 1968: Maximum daily discharge, 4,410 second-feet, January 21 and December 7 and 8, 1960; minimum discharge, no flow on various occasions. Maximum monthly discharge, 225,224 acre-feet, January 1960; minimum monthly discharge, zero during various months of several years. Annual maximum discharge, 503,260 acre-feet during 1960; minimum 59,335 acre-feet in 1968.

Mean Daily Gage Height in Feet 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.86	15.03	15.06	14.93	14.86	14.76	14.44	14.24	14.14	14.04	13.91	14.80
2	14.86	15.03	15.03	14.93	14.86	14.76	14.37	14.24	14.14	13.98	13.91	14.80
3	14.86	15.03	14.99	14.93	14.86	14.70	14.37	14.24	14.11	13.98	13.94	14.86
4	14.86	15.03	14.99	14.90	14.86	14.70	14.34	14.24	14.11	13.98	13.94	14.93
5	14.90	15.03	14.96	14.93	14.86	14.70	14.34	14.21	14.11	13.94	13.98	14.93
6	14.86	15.06	14.96	14.90	14.90	14.70	14.30	14.21	14.07	13.91	13.98	14.93
7	14.86	15.03	14.93	14.90	14.90	14.70	14.30	14.21	14.04	13.88	13.98	14.93
8	14.86	15.03	14.96	14.90	14.86	14.70	14.34	14.17	14.04	13.85	14.01	14.96
9	14.83	15.06	14.96	14.90	14.86	14.67	14.30	14.17	14.04	13.81	14.07	14.96
10	14.83	15.03	14.96	14.90	14.86	14.63	14.30	14.17	14.04	13.81	14.30	14.96
11	14.83	15.03	14.96	14.93	14.90	14.63	14.34	14.17	14.07	13.81	14.34	14.96
12	14.83	15.03	14.99	14.96	14.86	14.60	14.30	14.17	14.04	13.85	14.40	14.96
13	14.83	15.06	14.99	14.93	14.86	14.60	14.27	14.11	14.04	13.88	14.44	14.93
14	14.83	15.06	14.96	14.93	14.86	14.60	14.24	14.17	14.11	13.88	14.47	14.93
15	14.86	15.06	14.96	14.93	14.86	14.57	14.24	14.17	14.14	13.88	14.53	14.93
16	14.86	15.06	14.96	14.90	14.83	14.57	14.24	14.11	14.14	13.88	14.60	14.93
17	14.90	15.06	14.99	14.90	14.83	14.53	14.24	14.11	14.14	13.88	14.60	14.96
18	14.90	15.06	14.99	14.90	14.83	14.53	14.21	14.11	14.14	13.88	14.60	14.96
19	14.99	15.06	14.99	14.90	14.86	14.53	14.21	14.11	14.11	13.88	14.63	14.96
20	14.96	15.03	14.99	14.90	14.86	14.50	14.24	14.11	14.17	13.88	14.67	14.96
21	14.96	15.03	14.99	14.90	14.90	14.50	14.27	14.11	14.11	13.91	14.70	14.96
22	15.03	15.03	14.99	14.93	14.90	14.50	14.27	14.04	14.11	13.91	14.70	14.96
23	15.03	15.06	14.99	14.90	14.86	14.50	14.21	14.04	14.11	13.91	14.73	14.96
24	15.06	15.06	14.96	14.90	14.86	14.50	14.21	14.04	14.11	13.91	14.73	14.96
25	15.06	15.09	14.93	14.90	14.83	14.50	14.21	14.04	14.11	13.91	14.73	14.96
26	15.03	15.06	14.93	14.83	14.83	14.47	14.24	14.04	14.11	13.91	14.73	14.96
27	15.03	15.06	14.93	14.83	14.83	14.50	14.17	14.04	14.11	13.91	14.73	14.93
28	15.03	15.09	14.93	14.86	14.83	14.50	14.17	14.11	14.11	13.91	14.73	14.90
29	15.03		14.93	14.90	14.83	14.44	14.14	14.17	14.11	13.94	14.76	14.86
30	15.03		14.93	14.90	14.83	14.44	14.21	14.17	14.04	13.91	14.76	14.86
31	15.03		14.93		14.83		14.17	14.17		13.91		14.90
Avg.	14.93	15.05	14.97	14.90	14.86	14.58	14.26	14.14	14.10	13.90	14.42	14.93

STORED WATER IN LARGE RESERVOIRS OF THE COLORADO RIVER

Data are presented below for all large storage reservoirs in the Colorado River basin below Lee's Ferry, all of which are located in the United States. The monthly figures represent usable contents on the last day of the month, in thousands of acre-feet. The capacities indicated are usable capacities at the top of the spillway gates in closed position, for those dams having controlled spillways; for all others, capacities indicated are at spillway level. Records furnished by the U. S. Geological Survey.

In Thousands of Acre-Feet

Month	LAKE MEAD (Capacity 26,159.0)		LAKE MOHAVE (Capacity 1,810.0)		HAVASU LAKE (Capacity 619.4)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 28,588.4)	
	1969	Average 1935-1969	1969	Average 1951-1969	1969	Average 1939-1969	1969	Estimated Average
Jan.	15,441.0	16,443.0	1,694.0	1,654.4	532.4	556.6	17,667.4	18,654.0
Feb.	15,464.0	16,124.7	1,664.0	1,677.0	553.5	560.9	17,681.5	18,362.6
Mar.	15,386.0	15,827.7	1,653.0	1,678.7	554.8	575.5	17,593.8	18,081.9
Apr.	15,476.0	16,005.4	1,710.0	1,697.5	598.8	604.3	17,784.8	18,307.2
May	15,526.0	17,169.8	1,759.0	1,742.0	609.8	601.4	17,894.8	19,513.2
June	15,583.0	18,775.1	1,708.0	1,619.2	607.0	605.1	17,898.0	20,999.4
July	15,747.0	18,996.4	1,601.0	1,485.6	586.3	593.1	17,934.3	21,075.1
Aug.	15,962.0	18,706.2	1,422.0	1,402.9	572.4	575.9	17,956.4	20,685.0
Sept.	16,131.0	18,329.6	1,441.0	1,399.6	565.0	571.4	18,137.0	20,300.6
Oct.	16,171.0	17,997.9	1,424.0	1,418.4	559.0	575.9	18,154.0	19,992.2
Nov.	16,446.0	17,693.4	1,505.0	1,505.9	555.0	563.8	18,506.0	19,763.1
Dec.	16,760.0	17,333.4	1,519.0	1,612.5	538.9	559.1	18,817.9	19,505.0
Avg.	15,841.1	17,450.2	1,591.7	1,574.5	569.4	578.6	18,002.2	19,603.3
Max.	16,760.0	27,780.0	1,759.0	1,808.0	609.8	688.7	18,817.9	28,235.0
Min.	15,386.0	* 10,727.0	1,422.0	1,186.0	532.4	76.9	17,593.8	13,062.6

* Minimum since 1940

SUSPENDED SILT

The following tables are based on determinations of gravimetric percentages of dry silt in water samples taken at each station by one of the following methods:

A. By lowering a D-43 depth integrating sampler at verticals located at centers of sections of equal discharge in the river cross section, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

B. By lowering a D-43 depth integrating sampler at verticals located at centers of each span of the service bridge across the Alamo Canal, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

C. By sampling at the stream surface with a separate bottle at each of three points, spaced 1/6, 1/2, and 5/6 of the stream width. The gravimetric percentage in each sample is determined, a coefficient of 1.10 is applied to the average of the three, and the product applied to the volume of the stream flow represented by that set of samples.

For ease of comparison, the assumption is made that 1,847 tons of deposited silt would occupy a volume of one acre-foot, or one cubic foot of deposited silt would weigh 85 pounds.

Month	1969						Period of Record		
	Tons		No. of Samples	Gravimetric Percentages			Acre-Feet at 1,847 Tons Per Acre Foot		
	Water	Silt		Average	Maximum Sample	Minimum Sample	Average	Maximum	Minimum

Colorado River at Northerly International Boundary

										Period 1956-1969		
Jan.	158,950,000	10,800	5	0.0068	0.0085	0.0048	5.8	40.5	336	1.6		
Feb.	107,597,000	6,700	4	.0062	.0079	.0044	3.6	18.0	116	1.6		
Mar.	257,236,000	22,000	4	.0085	.0104	.0041	11.9	57.2	499	8.8		
Apr.	267,936,000	19,800	5	.0074	.0109	.0035	10.7	53.1	434	9.4		
May	104,640,000	6,000	4	.0057	.0077	.0033	3.2	19.7	201	2.7		
June	148,767,000	10,800	4	.0072	.0098	.0051	5.8	19.0	92.6	5.0		
July	212,597,000	14,000	5	.0066	.0074	.0052	7.6	26.4	89.3	7.4		
Aug.	210,737,000	11,400	4	.0054	.0058	.0050	6.2	11.2	43.6	2.8		
Sept.	92,676,000	5,100	4	.0055	.0060	.0038	2.8	5.2	20.0	.8		
Oct.	60,747,000	2,800	5	.0046	.0064	.0038	1.5	14.7	89.9	1.0		
Nov.	66,948,000	6,400	4	.0095	.0299	.0032	3.5	28.2	174	.6		
Dec.	104,851,000	3,800	5	.0036	.0057	.0024	2.1					
Yearly	1,793,682,000	119,600	53	0.0067	0.0299	0.0024	64.8	317.9	2,198	64.8		

Samples and analyses by U. S. Section, Method A

Intake Canal at Morelos Diversion Structure

										Period 1952-1969		
Jan.	158,726,000	10,074	5	0.0064	0.0086	0.0039	5.4	5.9	22.3	0.2		
Feb.	107,106,000	5,333	4	.0050	.0060	.0035	2.9	6.2	19.4	.9		
Mar.	256,480,000	22,484	4	.0088	.0151	.0040	12.2	50.4	154	11.1		
Apr.	267,233,000	24,423	5	.0091	.0906	.0085	13.2	46.3	121	13.2		
May	104,135,000	8,005	4	.0077	.0128	.0044	4.3	12.8	51.2	1.9		
June	148,365,000	8,642	4	.0058	.0068	.0038	4.7	36.9	109	4.7		
July	212,175,000	15,397	5	.0073	.0082	.0062	8.3	53.7	156	8.3		
Aug.	210,280,000	13,957	4	.0066	.0079	.0051	7.6	49.2	135	7.6		
Sept.	92,297,000	6,500	5	.0070	.0093	.0029	3.5	20.3	64.7	1.9		
Oct.	60,401,000	1,956	5	.0032	.0042	.0024	1.1	4.6	12.0	.3		
Nov.	64,925,000	3,778	5	.0058	.0147	.0033	2.0	2.4	9.3	.2		
Dec.	104,564,000	6,075	4	.0058	.0095	.0040	3.3	4.9	14.8	1.1		
Yearly	1,786,687,000	126,624	54	0.0065	0.0906	0.0024	68.6	293.5	696	68.6		

Samples and analyses by Mexican Section, Method B

SUSPENDED SILT

Month	1969						Period of Record		
	Tons		No. of Samples	Gravimetric Percentages			Acre-Feet at 1,847 Tons Per Acre Foot		
	Water	Silt		Average	Maximum Sample	Minimum Sample	Average	Maximum	Minimum

Colorado River at Southerly International Boundary

Period 1946-1969

Jan.	13,527,000	1,500	5	0.0111	0.0121	0.0100				
Feb.	13,628,000	1,600	4	0.0117	.0150	.0077				
Mar.	5,151,000	700	3	.0136	.0223	.0060				
Apr.	2,101,000	100	5	.0048	.0113	.0020				
May	8,535,000	1,100	4	.0129	.0383	0				
June	3,955,000	400	4	.0101	.0199	.0026				
July	678,000	100	2	.0147	.0173	0				
Aug.	511,000	50	1	.0098	.0105	.0096				
Sept.	8,321,000	1,100	3	.0132	.0162	.0107				
Oct.	18,068,000		0							
Nov.	22,782,000		0							
Dec.	19,386,000		0							
Yearly	116,643,000		31							

Samples by U. S. Section and analyses by Mexican Section, Method C

Colorado River at Miguel C. Rodríguez Gaging Station

Period 1960-1969

Jan.	5,322,000	682	5	0.0128	0.0140	0.0120	0.4	28.2	251	0
Feb.	7,153,000	875	4	.0122	.0131	.0100	.5	4.1	13.9	0
Mar.	2,029,000	293	4	.0144	.0170	.0128	.2	0.6	4.1	0
Apr.	729,000	108	4	.0148	.0190	.0063	.1	0.2	1.1	0
May	643,000	99	5	.0154	.0306	.0021	.1	0.5	1.5	0
June	958,000	210	4	.0219	.0310	.0134	.1		.1	0
July	1,095,000	171	4	.0156	.0197	.0130	.1		.2	0
Aug.	1,278,000	167	4	.0130	.0163	.0100	.1	0.1	.2	0
Sept.	1,647,000	218	4	.0133	.0157	.0087	.1	.5	4.5	0
Oct.	6,376,000	1,044	4	.0164	.0207	.0071	.6	2.9	20.8	.1
Nov.	13,557,000	3,163	3	.0233	.0273	.0211	1.7	4.9	36.0	.3
Dec.	10,191,000	2,567	5	.0025	.0591	.0093	1.4	4.7	13.0	0
Yearly	50,976,000	9,597	50	0.0146	0.0591	0.0021	5.2	46.7	289	2.4

Samples and analyses by Mexican Section, Method C

CHEMICAL ANALYSES OF WATER SAMPLES

1969

The tables below are based on chemical analyses of weekly samples from the Colorado River at the Northerly International Boundary taken by the United States Section of the Commission and analyzed by the U. S. Geological Survey. Samples from the Intake Canal at Morelos Diversion Structure were taken by the Mexican Section of the Commission and analyzed by the Ministry of Hydraulic Resources.

To convert milligram equivalents to parts per million by weight, multiply each ion by its appropriate conversion factor. These factors are: Ca, 20.04; Mg, 12.16; Na, 22.99; (CO₂ plus HCO₃) expressed as CO₂, 30.00; SO₄, 48.03; Cl, 35.45; NO₃, 62.00. To convert tons per acre-foot to parts per million, multiply tons per acre-foot by 735.5. Electrical conductivity, reported in the tables as ECx10⁶ at 25°C, is a relative measure of the total salt concentration.

Month	No. of Samples	Dissolved Solids		ECx10 ⁶ @25°C	Boron p. p. m.	pH	% Na **	% Cl ***	Mean Milligram Equivalents per Liter						
		Tons Per Acre-Foot	Total Tons						Ca	Mg	Na	CO ₂ + HCO ₃	SO ₄	Cl	NO ₃

Colorado River at Northerly International Boundary

Jan.	4	1.59	186,000	2,050		7.8	52	42	5.86	3.73	10.52	3.49	8.28	8.51	
Feb.	4	1.57	124,000	1,970		7.9	51	41	5.96	3.56	9.94	3.42	8.01	8.03	
Mar.	4	1.61	305,000	2,050		7.8	52	43	5.71	3.87	10.41	3.23	8.26	8.50	
Apr.	5	1.62	320,000	2,040		7.8	52	42	5.96	3.64	10.41	3.29	8.38	8.35	
May	4	1.62	125,000	1,990		7.8	52	38	5.96	3.62	10.31	3.46	8.92	7.51	
June	5	1.73	189,000	2,120		7.8	53	41	6.20	3.80	11.91	3.48	9.00	8.72	
July	4	1.66	260,000	2,030		7.9	52	41	6.03	3.66	10.50	3.28	8.63	8.28	
Aug.	4	1.64	254,000	1,980		8.1	53	40	5.74	3.72	10.63	3.27	8.75	8.06	
Sept.	5	1.57	107,000	1,930		8.1	51	39	5.73	3.90	9.94	3.37	8.60	7.61	
Oct.	5	1.33	59,500	1,600		8.2	46	31	5.26	3.45	7.43	3.16	7.94	5.04	
Nov.	5	1.46	71,700	1,650		8.1	48	32	5.35	3.36	8.23	3.38	8.08	5.47	
Dec.	5	1.65	127,000	1,870		8.2	51	37	5.82	3.64	9.72	3.39	8.75	7.03	
Mean @	Ø54	1.61	Ø2,128,200	1,990		8.0	51	39	5.85	3.70	10.30	3.34	8.49	7.97	
Period Avg.		1.78	2,706,000	2,159		7.8			6.32	3.97	11.32	3.28	8.59	9.74	
Tons of Constituents 1969									208,000	79,600	406,000	180,000	730,000	475,000	
Avg. Tons Period 1962-1969									262,000	99,800	540,000	202,000	849,000	722,000	

Intake Canal at Morelos Diversion Structure

Jan.	31	1.71	200,000	1,956		7.9	50		5.62	3.85	9.76	3.53	8.04	7.65	
Feb.	28	1.71	135,000	1,944		7.9	50		5.66	3.94	9.45	3.56	7.79	7.65	
Mar.	31	1.75	331,000	2,034		8.0	50		5.74	4.24	9.97	3.45	7.91	8.58	
Apr.	30	1.74	343,000	2,015		8.0	50		5.80	4.09	9.86	3.43	8.06	8.24	
May	31	1.74	134,000	2,002		7.9	50		5.71	4.17	9.73	3.61	8.31	7.68	
June	30	1.85	201,000	2,121		7.9	52		5.85	4.15	10.76	3.60	8.60	8.55	
July	31	1.79	279,000	2,064		8.0	51		5.74	4.12	10.44	3.43	8.39	8.47	
Aug.	31	1.77	273,000	2,032		8.0	51		5.69	4.13	10.15	3.40	8.22	8.35	
Sept.	30	1.73	117,000	1,920		8.0	49		5.56	3.99	9.27	3.47	7.98	7.36	
Oct.	31	1.44	63,900	1,635		8.0	46		5.08	3.57	7.29	3.40	7.43	5.12	
Nov.	30	1.55	74,200	1,791		7.9	47		5.41	3.75	8.34	3.62	7.88	6.01	
Dec.	31	1.75	135,000	2,005		7.9	50		5.68	4.01	9.92	3.61	8.09	7.91	
Mean @	Ø365	1.71	Ø2,286,000	1,960		8.0	50		5.63	4.00	9.58	3.51	8.06	7.63	
Period Avg.		1.82	2,608,000	2,129		8.0	50		5.88	4.52	10.68	3.35	8.12	9.62	
Tons of Constituents 1969									184,000	138,000	367,000	345,000	631,000	459,000	
Avg. Tons Period 1962-1969									202,000	101,000	384,000	340,000	670,000	586,000	

Ø Total ** Percent of total cations *** Percent of total anions @ Weighted mean

ELECTRICAL CONDUCTIVITY OF WATER SAMPLES

1969

The following tables show electrical conductivity, expressed in mhos per centimeter cube x 10⁶ at 25°C, of individual water samples taken at Colorado River stations and in Mexican canals. Samples were taken at the Northerly and Southerly International Boundary stations by the United States Section of the Commission and conductivity determinations were made by the United States Geological Survey. Samples for the Intake Canal at Morelos Dam, Sánchez Mejorada Canal, and Miguel C. Rodríguez Gaging Station were taken by the Mexican Section of the Commission and determinations were made by the Ministry of Hydraulic Resources.

Date	ECx10 ⁶ @25°C										
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Colorado River at Northerly International Boundary

January	February	April	May	July	August	October	November
1 2,170	15 1,790	1 2,030	19 1,940	3 2,090	18 1,970	2 1,550	17 1,720
2 2,140	16 1,950	2 1,980	20 1,930	4 2,020	19 1,970	3 1,550	18 1,860
3 2,070	17 2,090	3 2,010	21 1,940	5 2,070	20 1,880	4 1,560	19 1,870
4 2,160	18 2,010	4 2,000	22 1,950	6 2,090	21 1,910	5 1,570	20 1,960
5 2,170	19 2,010	5 1,890	23 1,890	7 2,010	22 1,960	6 1,600	21 1,930
6 1,990	20 1,910	6 1,850	24 1,890	8 2,050	23 1,990	7 1,570	22 1,930
7 1,970	21 1,860	7 2,040	25 1,900	9 2,090	24 1,970	8 1,580	23 2,070
8 1,930	22 1,900	8 2,050	26 2,060	10 2,070	25 1,990	9 1,550	24 2,010
9 1,940	23 1,910	9 2,020	27 2,060	11 2,030	26 1,950	10 1,560	25 1,910
10 2,070	24 2,040	10 2,010	28 2,100	12 2,040	27 1,930	11 1,550	26 1,990
11 2,110	25 1,980	11 2,100	29 2,100	13 1,980	28 1,970	12 1,550	27 1,950
12 1,990	26 1,970	12 1,950	30 2,030	14 2,100	29 1,850	13 1,590	28 1,940
13 2,080	27 2,030	13 1,980	31 2,060	15 2,040	30 1,970	14 1,520	29 1,910
14 2,050	28 2,010	14 2,080		16 2,050	31 1,970	15 1,520	30 1,850
15 1,970	March	15 2,080	1 2,110	17 2,040	September	16 1,550	December
16 1,420	1 2,000	16 2,120	2 2,090	18 2,030	1 2,040	17 1,650	1 1,850
17 1,400	2 2,020	17 2,060	3 2,090	19 2,050	2 2,000	18 1,600	2 1,860
18 1,930	3 2,080	18 2,020	4 2,030	20 1,930	3 1,960	19 1,570	3 1,800
19 2,110	4 2,040	19 2,040	5 2,020	21 2,010	4 2,040	20 1,630	4 1,820
20 2,310	5 2,080	20 2,040	6 2,060	22 2,010	5 1,950	21 1,600	5 1,860
21 2,270	6 1,990	21 2,000	7 2,110	23 2,010	6 1,970	22 1,670	6 1,800
22 1,860	7 2,070	22 1,950	8 2,100	24 1,970	7 2,020	23 1,640	7 1,770
23 1,740	8 1,940	23 2,040	9 2,090	25 1,980	8 2,050	24 1,590	8 1,730
24 1,720	9 1,910	24 2,050	10 2,020	26 1,990	9 2,050	25 1,570	9 2,230
25 1,780	10 2,020	25 1,970	11 1,950	27 1,910	10 1,890	26 1,580	10 2,160
26 1,860	11 2,010	26 2,010	12 2,050	28 1,950	11 1,920	27 1,600	11 2,040
27 1,860	12 2,010	27 1,950	13 2,000	29 1,940	12 1,980	28 1,610	12 1,930
28 1,930	13 2,030	30 1,880	14 2,050	30 1,960	13 1,910	29 1,610	13 1,890
29 1,900	14 2,000	May	15 2,050	31 1,960	14 1,900	30 1,610	14 1,930
30 1,920	15 1,900	1 2,030	16 2,130	August	15 1,980	31 1,580	15 1,900
31 1,950	16 1,920	2 1,990	17 2,090	1 1,940	16 1,740	November	16 1,890
February	17 2,070	3 1,930	18 2,110	2 1,990	17 1,710	1 1,620	17 1,880
1 1,960	18 2,050	4 2,020	19 2,100	3 2,010	18 1,750	2 1,600	18 1,930
2 1,890	19 2,090	5 2,010	20 2,140	4 2,000	19 1,770	3 1,650	19 1,920
3 1,810	20 2,010	6 2,010	21 2,190	5 1,980	20 1,750	4 1,640	20 1,910
4 1,800	21 2,040	7 1,960	22 2,040	6 1,980	21 1,780	5 1,630	21 1,950
5 1,840	22 2,140	8 1,950	23 2,150	7 2,030	22 1,790	6 1,560	22 1,960
6 1,810	23 1,930	9 1,920	24 2,080	8 1,980	23 1,800	7 1,580	23 1,960
7 1,740	24 2,050	10 1,810	25 2,090	9 1,920	24 1,770	8 1,560	24 1,950
8 1,760	25 1,980	11 1,810	26 2,090	10 1,950	25 1,580	9 1,550	25 2,020
9 1,930	26 1,990	12 1,910	27 2,080	11 1,950	26 1,530	10 1,510	26 1,960
10 1,750	27 2,030	13 1,900	28 2,180	12 1,980	27 1,550	11 1,620	27 2,090
11 1,750	28 2,000	14 1,850	29 2,150	13 2,020	28 1,530	12 1,520	28 1,960
12 1,880	29 1,890	15 1,890	30 2,100	14 1,890	29 1,550	13 1,580	29 1,910
13 2,060	30 2,040	16 1,930	July	15 1,880	30 1,520	14 1,630	30 1,930
14 1,980	31 1,960	17 1,920	1 2,100	16 1,920	October	15 1,630	31 1,930
		18 1,950	2 2,060	17 1,850	1 1,550	16 1,590	

ELECTRICAL CONDUCTIVITY OF WATER SAMPLES

1969

Date	ECx10 ⁶ @25°C										
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Intake Canal at Morelos Diversion Structure

January	February	April	May	July	August	October	November
1 2,100	15 2,000	1 2,000	17 2,200	1 2,200	16 2,000	1 1,600	16 1,650
2 2,050	16 2,000	2 2,000	18 1,950	2 2,100	17 1,900	2 1,600	17 1,750
3 2,050	17 2,100	3 2,000	19 1,950	3 2,150	18 2,050	3 1,600	18 1,900
4 2,050	18 2,050	4 2,000	20 1,950	4 2,200	19 2,050	4 1,600	19 1,900
5 2,150	19 2,000	5 2,050	21 1,950	5 2,200	20 2,000	5 1,650	20 2,000
6 2,000	20 1,950	6 2,000	22 2,000	6 2,150	21 1,950	6 1,650	21 2,000
7 2,000	21 1,950	7 2,000	23 1,950	7 2,000	22 2,050	7 1,650	22 2,000
8 1,900	22 2,075	8 2,000	24 1,950	8 2,100	23 2,100	8 1,650	23 2,100
9 1,950	23 2,050	9 2,050	25 2,000	9 2,100	24 1,950	9 1,650	24 2,050
10 2,100	24 2,150	10 1,950	26 2,050	10 2,150	25 2,050	10 1,650	25 2,000
11 2,225	25 2,150	11 2,000	27 2,150	11 2,025	26 2,025	11 1,650	26 2,000
12 2,000	26 2,050	12 2,000	28 2,150	12 2,075	27 2,075	12 1,650	27 2,000
13 2,100	27 2,100	13 2,000	29 2,125	13 2,050	28 2,100	13 1,600	28 1,950
14 2,075	28 2,025	14 2,050	30 2,100	14 2,100	29 2,050	14 1,600	29 1,950
15 1,950	March	15 2,150	31 2,150	15 2,075	30 2,050	15 1,600	30 1,875
16 1,400	1 2,000	16 2,050	June	16 2,050	31 2,050	16 1,550	December
17 1,400	2 2,050	17 2,050	1 2,125	17 2,075	September	17 1,650	1 1,900
18 2,175	3 2,100	18 2,050	2 2,125	18 2,050	1 2,100	18 1,700	2 1,900
19 2,175	4 2,000	19 2,050	3 2,075	19 2,000	2 2,075	19 1,700	3 1,875
20 2,275	5 2,100	20 1,975	4 2,075	20 2,000	3 2,100	20 1,700	4 1,875
21 2,200	6 2,000	21 1,975	5 2,025	21 2,050	4 2,150	21 1,675	5 1,900
22 1,850	7 2,050	22 1,975	6 2,100	22 2,000	5 2,100	22 1,700	6 1,850
23 1,700	8 2,100	23 1,975	7 2,150	23 2,000	6 2,100	23 1,675	7 1,850
24 1,700	9 2,000	24 2,000	8 2,125	24 2,000	7 2,300	24 1,625	8 1,750
25 1,800	10 1,950	25 2,000	9 2,150	25 2,100	8 2,150	25 1,600	9 2,350
26 1,825	11 2,150	26 2,050	10 2,050	26 2,000	9 2,150	26 1,600	10 2,200
27 1,850	12 2,100	27 2,050	11 2,000	27 1,975	10 2,050	27 1,600	11 2,100
28 1,900	13 2,100	28 2,050	12 2,050	28 2,000	11 2,000	28 1,650	12 2,050
29 1,850	14 2,000	29 1,950	13 2,000	29 2,000	12 2,000	29 1,600	13 1,900
30 1,900	15 2,000	30 2,000	14 2,150	30 2,000	13 2,000	30 1,625	14 2,050
31 1,950	16 2,050	May	15 2,100	31 2,000	14 2,075	31 1,650	15 2,050
February	17 2,050	1 2,050	16 2,100	August	15 2,050	November	16 2,000
1 1,950	18 2,000	2 2,075	17 2,100	1 2,050	16 1,850	1 1,675	17 2,000
2 1,850	19 2,000	3 2,000	18 2,150	2 2,075	17 1,800	2 1,650	18 2,000
3 1,850	20 2,000	4 2,000	19 2,150	3 2,050	18 1,800	3 1,700	19 2,000
4 1,800	21 2,000	5 2,050	20 2,150	4 2,000	19 1,800	4 1,700	20 2,000
5 1,850	22 2,000	6 2,050	21 2,150	5 2,000	20 1,800	5 1,650	21 2,000
6 1,800	23 1,950	7 2,000	22 2,125	6 2,050	21 1,850	6 1,600	22 2,000
7 1,800	24 2,050	8 2,000	23 2,200	7 2,050	22 1,850	7 1,625	23 2,025
8 1,750	25 2,000	9 1,950	24 2,225	8 2,075	23 1,850	8 1,600	24 2,000
9 1,750	26 2,000	10 1,900	25 2,225	9 2,100	24 1,850	9 1,600	25 2,050
10 1,700	27 2,050	11 1,850	26 2,200	10 1,975	25 1,700	10 1,600	26 2,075
11 1,775	28 2,050	12 1,900	27 2,100	11 2,075	26 1,650	11 1,700	27 2,200
12 1,900	29 2,000	13 1,950	28 2,200	12 2,050	27 1,600	12 1,550	28 2,100
13 2,000	30 2,100	14 1,900	29 2,150	13 2,100	28 1,600	13 1,600	29 2,050
14 2,000	31 2,050	15 1,950	30 2,100	14 1,950	29 1,600	14 1,675	30 2,000
		16 2,000		15 1,950	30 1,600	15 1,675	31 2,050

Colorado River at Southerly International Boundary

January	March	May	August	September	October	November	December
30 7,300	27 2,270	29 4,420	28 4,050	30 7,000	30 6,770	11 4,830	30 6,980
February	April	June				25 6,840	
27 5,190	29 4,850	26 4,770					

ELECTRICAL CONDUCTIVITY OF WATER SAMPLES

1969

Date	ECx10 ⁶ @25°C								
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Sánchez Mejorada Canal

January	February	April	May	July	August	October	November
3 2,375	20 2,350	2 2,550	23 2,500	4 2,500	18 2,450	3 2,525	28 2,500
9 2,300	27 2,550	10 2,550	29 2,600	9 2,400	28 2,500	15 2,800	December
17 2,500	March	17 2,700	June	16 2,500	September	23 2,600	4 2,600
24 2,550	6 2,550	24 2,400	3 2,600	24 2,500	2 2,400	24 2,700	9 2,600
28 2,700	13 2,600	29 2,550	13 2,600	August	12 2,400	November	22 2,550
February	18 2,550	May	19 2,650	1 2,700	17 2,500	7 2,500	30 2,550
6 2,550	25 2,500	6 2,550	26 2,650	7 2,500	26 2,500	13 2,500	
13 2,550		13 2,500		11 2,500		21 2,500	

Colorado River at Miguel C. Rodríguez Gaging Station

January	February	April	May	July	August	October	November
7 5,500	18 4,800	1 3,550	21 3,200	1 3,300	18 3,400	1 3,400	28 6,500
13 5,000	25 4,900	8 3,400	27 3,300	15 3,300	25 3,400	8 3,900	December
21 6,000	March	18 3,100	June	16 3,400	September	15 3,800	2 6,250
23 6,500	4 4,900	22 3,100	5 3,300	24 3,200	2 3,400	22 6,100	9 7,000
28 7,250	11 5,000	May	12 3,400	August	12 3,400	November	16 6,500
February	18 4,000	2 3,000	17 3,400	1 3,200	17 3,400	7 6,250	22 6,600
4 6,750	25 3,400	9 3,200	27 3,400	11 3,300	23 3,400	13 6,250	30 6,750
11 5,900		15 3,200				21 6,750	



RAINFALL ON THE COLORADO RIVER WATERSHED IN INCHES

Tabulated below are monthly records of rainfall at stations located in California and Arizona in the United States and in Baja California and Sonora in Mexico, with averages for their periods of record. Records of daily rainfall amounts, where available, are on file in the offices of the United States or Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listings of these stations on page 51 in this bulletin.

In United States

Month	Brawley, California		El Centro, California		Blythe, California		Davis Dam No. 2, Arizona		Yuma Citrus Station, Arizona	
	1969	Average 1931-1969	1969	Average 1931-1969	1969	Average 1931-1969	1969	Average 1955-1969	1969	Average 1931-1969
Jan.	1.02	0.33	0.79	0.36	0.88	0.47	1.21	0.42	0.61	0.39
Feb.	.07	.30	.05	.34	.04	.39	.32	.44	0	.33
Mar.	.05	.14	0	.18	.05	.37	.11	.29	.01	.20
Apr.	T	.08	0	.11	0	.15	0	.35	.09	.12
May	.01	.01	0	0	.02	.02	.65	.12	.07	.01
June	0	.01	0	.01	0	.03	.42	.03	0	.02
July	T	.05	T	.10	.33	.19	.09	.23	T	.18
Aug.	T	.30	.94	.33	.56	.75	.16	.49	T	.41
Sept.	1.04	.33	0	.27	.24	.33	.77	.32	0	.37
Oct.	T	.21	0	.23	.23	.28	.05	.31	0	.38
Nov.	.64	.16	1.52	.18	.85	.27	.23	.46	1.63	.20
Dec.	.10	.44	.03	.46	.06	.56	0	.52	.85	.42
Yearly	2.93	2.36	3.33	2.57	3.26	3.81	4.01	3.98	3.26	3.03

In Mexico

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis, R. C., Sonora		Delta, Baja California	
	1969	Average 1948-1969	1969	Average 1926-1969	1969	Average 1948-1969	1969	Average 1949-1969	1969	Average 1948-1969
Jan.	.71	.43	.94	.35	.83	.35	.51	.31	.39	.39
Feb.	0	.16	.04	.31		.04		.16		.08
Mar.	0	.08	.08	.20		.04		.12		.08
Apr.	0	.08	0	.08		.08			0	.04
May	.04	0	0	0	0	0	.12	0	0	0
June	0	0	0	0	0	0	0	0	0	0
July	.12	.08	.20	.12	.55	.04	0	.20		.04
Aug.	0	.16	.12	.31	0	.12		.35		.12
Sept.	.08	.20	1.18	.39	0	.04	.71	.20	.08	.16
Oct.	0	.28		.24	0	.20		.16		.16
Nov.	1.54	.20	.83	.16	1.61	.16	2.01	.67	1.65	.16
Dec.	.63	.35	.08	.83	.59	.24	.75	.59	.31	.31
Yearly	3.11	2.05	3.46	3.03	3.58	1.30	4.09	1.85	2.44	1.54

Month	Kilometer 50, Baja California		Riito, Sonora		El Mayor, Baja California		San Felipe, Baja California			
	1969	Average 1952-1969	1969	Average 1959-1969	1969	Average 1949-1969	1969	Average 1948-1969		
Jan.	.71	.63	.39	.28	.55	.20	.87	.28		
Feb.	0	.24		.08		.08	.16	.08		
Mar.	.04	.24		.04	.04	.08	0	.16		
Apr.	.08	.16			0	.04	0	.08		
May	.16	.04	.24	.04	0		.39	.04		
June	0	0	0	0	0		0	.08		
July	0	.16		.08	0	.08	0	.12		
Aug.	0	.31	.04	.08		.31	0	.28		
Sept.	0	.24	1.61	.67	.47	.59	1.02	.47		
Oct.	0	.35		.04	0	.20	0	.28		
Nov.	2.09	.31	1.89	.39	1.81	.16	1.65	.16		
Dec.	.43	.35	.75	.47	.98	.35	.87	.39		
Yearly	3.50	1.93	4.92	2.20	3.86	2.20	4.57	2.52		

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LOCATION OF RAINFALL STATIONS ON THE COLORADO RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1969.

In United States

NAME OF STATION	LATI- TUDE	LONGI- TUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
* Blythe, California	33° 37'	114° 36'	268	1909	State Division of Forestry
Brawley, California	32° 57'	115° 33'	100	1908	Agricultural Research Service
* Davis Dam No. 2, Arizona	35° 12'	114° 34'	657	1954	U. S. Bureau of Reclamation
El Centro, California	32° 46'	115° 34'	30	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32° 37'	114° 39'	191	1923	University of Arizona Experimental Farm

In Mexico

NAME OF STATION	LATI- TUDE	LONGI- TUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32° 33'	115° 04'	** 66	1948	Hydraulic Resources
Delta, Baja California	32° 21'	115° 11'	** 39	1948	Hydraulic Resources
El Mayor, Baja California	32° 08'	115° 15'	** 33	1949	Hydraulic Resources
Kilometer 50, Baja California	32° 15'	115° 03'	49	1952	Hydraulic Resources
Los Algodones, Baja California	32° 42'	114° 44'	115	1948	Hydraulic Resources
Mexicali, Baja California	32° 40'	115° 28'	13	1926	Hydraulic Resources
Riito, Sonora	32° 10'	114° 57'	** 39	1959	Hydraulic Resources
* San Felipe, Baja California	31° 02'	114° 53'	33	1948	Hydraulic Resources
San Luis, R. C., Sonora	32° 28'	114° 47'	131	1949	Hydraulic Resources

* Not shown on map δ Elevation above mean sea level except Brawley and El Centro which are elevations below mean sea level

** Elevations obtained from International Boundary and Water Commission topographic maps

EVAPORATION IN THE COLORADO RIVER BASIN IN INCHES

Tabulated below are records of evaporation observed at two stations in Arizona and at eight stations in Baja California and Sonora, Mexico. The stations in the United States are operated by the U. S. Bureau of Reclamation and by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Hydraulic Resources. The type of pan used at all these stations was the U. S. Weather Bureau standard pan, four feet in diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations", page 51 in this bulletin.

In United States

Month	Davis Dam No. 2, Arizona		Yuma Citrus Station, Arizona	
	1969	Average 1955-1969	1969	Average 1931-1969
Jan.	6.00	7.49	# 4.36	3.91
Feb.	5.64	7.56	4.23	4.91
Mar.	# 8.81	10.16	# 8.04	6 7.88
Apr.	# 13.61	13.48	11.39	10.32
May	16.04	17.08	12.40	13.38
June	18.65	19.69	13.61	14.59
July	19.06	20.24	14.16	15.78
Aug.	18.65	18.36	# 14.44	13.97
Sept.	12.66	14.88	10.19	11.06
Oct.	# 12.59	12.37	7.78	8.02
Nov.	10.76	8.91	5.11	5.09
Dec.	9.00	8.11	3.31	3.69
Yearly	151.47	158.33	109.02	112.60

In Mexico

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis, R. C., Sonora	
	1969	Av. 1949-55 1961-1969	1969	Average 1926-1969	1969	Average 1963-1969	1969	Average 1953-1969
Jan.	3.74	4.17	2.48	2.60	4.02	3.98	3.15	3.35
Feb.	4.17	5.16	3.35	3.50	4.61	5.28	3.66	4.02
Mar.	8.27	7.20	6.57	5.83	8.11	7.44	6.85	6.26
Apr.	11.30	9.76	9.02	7.91	9.65	9.25	9.02	8.50
May	12.56	12.36	10.47	10.51	11.34	11.89	11.50	10.98
June	13.39	12.80	11.30	11.50	12.17	12.09	12.56	12.56
July	14.06	12.87	11.65	11.69	12.44	12.36	13.23	14.17
Aug.	13.35	11.77	12.09	10.08	13.23	10.43	12.91	12.99
Sept.	10.20	9.57	8.94	8.11	8.78	7.68	8.78	10.08
Oct.	8.03	7.76	6.14	5.63	6.77	6.26	5.98	6.73
Nov.	5.98	4.84	3.15	3.35	3.94	5.63	4.25	4.45
Dec.	3.15	3.94	2.48	2.44	2.60	4.02	2.28	3.27
Yearly	108.19	103.70	87.64	83.15	97.64	96.38	94.17	99.45

Month	Delta, Baja California		Riito, Sonora		El Mayor, Baja California		San Felipe, Baja California	
	1969	Average 1959-1969	1969	Average 1963-1969	1969	Average 1953-1969	1969	Average 1952-1969
Jan.	2.76	3.27	2.83	3.27	2.20	3.54	4.65	5.16
Feb.	4.06	4.25	3.54	4.29	3.82	4.33	4.25	5.94
Mar.	7.40	6.42	6.26	6.06	6.77	6.22	9.33	7.05
Apr.	8.54	8.19	8.54	7.36	8.19	8.19	9.96	8.62
May	11.22	10.31	11.50	9.57	10.35	10.12	9.41	10.55
June	11.30	11.10	11.93	10.83	11.10	11.18	10.39	10.98
July	12.40	11.14	12.99	11.81	11.93	12.60	13.74	11.77
Aug.	12.17	9.80	12.56	9.33	10.55	11.77	13.31	11.06
Sept.	7.83	7.83	8.07	7.44	7.68	10.24	7.87	9.88
Oct.	5.47	5.79	5.24	5.20	5.59	7.87	8.15	8.58
Nov.	3.27	3.62	3.23	3.39	4.69	4.65	6.14	6.26
Dec.	2.32	2.68	1.89	2.80	2.56	3.74	5.31	5.16
Yearly	88.74	85.08	88.58	86.06	85.43	93.74	102.52	101.30

Adjusted to full month

0 One year missing

TEMPERATURE IN THE COLORADO RIVER BASIN IN DEGREES FAHRENHEIT

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few feet above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations", page 51 in this bulletin.

In United States

Month	Blythe, California				Davis Dam No. 2, Arizona				Yuma Citrus Station, Arizona			
	1969			Average 1931-69	1969			Average 1955-69	1969			Average 1931-69
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	57.7	78	28	52.6	Ø 55.6	# 71	# 31	52.9	57.6	81	30	53.1
Feb.	55.9	76	28	57.2	Ø 53.8	# 70	# 33	56.5	55.3	78	30	56.9
Mar.	61.6	97	33	63.0	Ø 59.7	# 93	# 37	62.1	60.0	98	32	
Apr.	70.7	96	44	70.5	Ø 72.0	# 97	# 47	69.9	68.9	94	43	69.0
May	80.1	109	52	77.5	Ø 80.8	# 110	# 53	78.7	77.3	106	49	76.0
June	83.2	111	59	84.8	Ø 87.5	108	68	88.2	80.7	109	55	83.3
July	93.3	115	65	92.0	Ø 95.3	# 115	# 70	94.8	90.4	113	63	91.2
Aug.	96.0	117	70	91.1	Ø 98.0	118	77	93.6	93.2	117	69	90.6
Sept.	87.9	114	62	85.2	Ø 88.9	# 114	# 64	86.2	85.9	# 113	57	85.2
Oct.	70.4	103	45	73.4		# 104	# 50		69.5	104	41	73.9
Nov.	61.8	88	37	60.3		# 90	# 42		62.7	88	39	61.7
Dec.	54.4	77	28	53.4	Ø 56.6	# 82	# 38	54.5	55.3	80	30	54.8
Yearly	72.8	117	28	71.8		118	31		71.4	117	30	

Month	Brawley, California				El Centro, California			
	1969			Average 1931-69	1969			Average 1931-69
	Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	57.3	81	27	53.7	57.8	81	29	53.6
Feb.	55.3	77	30	58.0	55.6	77	30	57.7
Mar.	61.3	95	35	63.5	61.4	# 97	35	63.1
Apr.	68.9	95	40	70.6	68.5	95	41	70.1
May	77.6	107	48	77.9	78.6	109	47	77.4
June	80.5	106	52	85.1	81.8	110	58	84.8
July	90.7	115	62	92.2	91.9	115	63	91.9
Aug.	93.5	116	62	91.9	95.0	# 118	71	91.2
Sept.	87.0	115	61	86.6	88.7	116	61	85.8
Oct.	70.5	107	46	75.4	71.2	104	46	74.9
Nov.	63.1	90	37	62.7	63.1	90	37	62.2
Dec.	55.4	78	28	55.3	56.2	77	29	54.9
Yearly	71.8	116	27	72.7	72.5	118	29	72.3

In Mexico

Month	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	1969		1949-1969		1969		1926-1969		1969		1948-1969	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	79	32	86	23	81	28	93	19	82	30	113	19
Feb.	79	30	95	28	79	30	93	23	79	27	99	21
Mar.	97	39	100	32	97	34	100	32	100	34	113	25
Apr.	93	48	109	37	95	45	106	34	97	41	118	16
May	108	52	117	43	108	50	117	43	109	39	124	34
June	113	63	126	52	111	57	120	50	111	59	135	43
July	113	68	118	61	115	64	118	55	117	57	133	45
Aug.	118	73	120	61	117	72	118	54	120	72	129	46
Sept.	115	68	122	54	115	63	122	48	117	59	135	39
Oct.	102	48	111	32	104	46	109	39	102	43	118	41
Nov.	100	42	100	27	88	39	99	28	88	36	115	32
Dec.	79	32	88	28	79	30	90	23	81	36	97	25
Yearly	118	30	126	23	117	28	122	19	120	27	135	16

Ø Less than 10 days missing # One or more days missing

TEMPERATURE IN THE COLORADO RIVER BASIN IN DEGREES FAHRENHEIT

In Mexico

Month	San Luis, R. C., Sonora				Delta, Baja California				Kilometer 50, Baja California			
	1969		1949-1969		1969		1948-1969		1969		1950-59, 1961-69	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	75	28	100	19	86	32	104	30	68	30	91	19
Feb.	77	28	109	27	81	32	108	28	68	30	97	21
Mar.	95	36	108	32	100	37	113	28	88	32	99	28
Apr.	93	43	115	37	97	50	118	32	88	43	106	30
May	106	50	115	41	109	50	129	32	97	45	117	36
June	111	57	126	45	111	54	133	36	99	50	117	39
July	113	66	126	59	117	64	135	45	109	61	120	45
Aug.	115	72	122	55	117	75	140	52	109	66	118	50
Sept.	111	61	118	50	118	61	135	39	109	57	115	39
Oct.	100	43	118	43	104	46	117	36	100	43	108	36
Nov.	86	36	113	30	91	41	120	32	90	34	104	25
Dec.	73	23	102	23	81	34	104	27	97	30	97	19
Yearly	115	23	126	19	118	32	140	27	109	30	120	19

Month	Riito, Sonora				El Mayor, Baja California				San Felipe, Baja California			
	1969		1949-1969		1969		1949-1969		1969		1948-1969	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	81	28	91	19	90	32	108	23	82	36	99	32
Feb.	77	28	95	21	84	32	93	27	70	34	102	32
Mar.	95	32	100	25	95	32	100	32	88	39	104	32
Apr.	97	45	109	37	97	46	108	36	104	52	113	37
May	106	50	115	43	104	50	113	37	97	46	120	41
June	104	52	124	45	104	52	122	37	97	57	124	50
July	115	55	140	52	120	66	122	39	106	64	124	50
Aug.	113	57	122	46	115	61	122	41	113	68	135	41
Sept.	111	57	118	39	111	57	120	34	104	63	126	37
Oct.	99	41	115	34	100	43	120	37	91	50	117	41
Nov.	100	37	118	27	88	41	120	34	82	43	118	21
Dec.	75	27	86	21	86	34	106	19	75	34	97	28
Yearly	115	27	140	19	120	32	122	19	113	34	135	21

IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM 1969

The total drainage area within the Colorado River basin is about 246,000 square miles, of which 184,600 square miles lie above Imperial Dam and about 61,400 square miles are below the dam. Of the area below Imperial Dam, 59,400 square miles are in the United States and about 2,000 square miles are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 58,200 square miles, of which about 1,100 square miles are in Mexico.

The irrigated areas tabulated below comprise the areas in the United States and Mexico which are served by diversions from the Colorado River at or below Imperial Dam. The diversions are supplemented by some pumping from wells in both countries. The areas in the United States include: 1) those within the U. S. Bureau of Reclamation Projects and in the North and South Gila Valleys located near Yuma, Arizona, the data for which are furnished by the U. S. Bureau of Reclamation; 2) those within the Coachella Valley, California, the data for which are furnished by the Coachella Valley County Water District and State of California Department of Water Resources; and 3) those within the Imperial Valley, California, the data for which are furnished by the Imperial Irrigation District. The areas in Mexico include those in the Mexicali Valley located in the states of Baja California and Sonora, the data for which are furnished by the Ministry of Hydraulic Resources of Mexico. The areas tabulated below refer to the total areas farmed, and insofar as possible, duplication of irrigated areas because of double cropping has been eliminated.

Point of Diversion from Colorado River and Designation of Areas	Total Irrigated Areas Acres
IN UNITED STATES:	
Imperial Dam	
Yuma Valley Division	44,852
Reservation Division	11,669
Yuma Mesa	17,222
Yuma Aux. Project Unit "B" (Yuma Mesa)	3,221
South Gila Valley	10,232
North Gila Valley	5,882
Wellton-Mohawk	60,124
Coachella Valley	54,480
Imperial Valley	442,294
Warren Act	80
Non-Project lands adjacent to Colorado River	10,530
Total in United States	660,586
IN MEXICO:	
Morelos Dam	
Mexicali Valley	* 429,910
Total in United States and Mexico	1,090,496

* An estimated one-third of total acreage is served by pumping from ground water in Mexicali Valley

ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 7 miles east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and a few feet upstream from a 4-foot Cipolletti weir set in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal.

RECORDS: Computed on the basis of head on the Cipolletti weir from daily staff gage readings, and weir ratings as determined by monthly current meter measurements. Records obtained and furnished by Imperial Irrigation District. 1969 records excellent. Records available: June 1942 through 1969.

REMARKS: The flow at this station normally comprises seepage from the All-American Canal and drainage water from the Mexicali Valley which enters the United States.

EXTREMES: Maximum mean daily discharge, 258 second-feet (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949. Prior to the period of record, and since 1900, considerably higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a part of its flow passed through the Alamo River channel.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.00	2.21	2.32	2.55	2.21	2.32	2.00	2.00	2.32	2.00	2.21	2.00
2	2.10	2.21	2.55	2.55	2.21	2.00	2.44	2.00	2.21	2.00	2.21	2.10
3	2.10	2.21	2.32	2.44	2.21	2.00	2.44	2.00	2.21	2.00	2.21	2.21
4	2.10	2.21	2.32	2.55	2.44	1.79	2.44	2.10	2.21	1.79	2.21	2.00
5	2.10	2.21	2.67	2.67	2.32	1.79	2.21	2.00	2.32	2.00	2.00	2.21
6	2.21	2.21	2.67	2.67	2.32	2.00	2.21	2.44	2.21	2.00	2.00	2.00
7	2.00	2.21	2.67	2.55	2.32	1.89	2.21	2.00	2.32	2.21	2.00	2.21
8	2.55	2.21	2.44	2.44	2.44	2.00	2.00	2.00	2.32	1.79	2.21	2.21
9	2.21	2.21	2.44	2.55	2.32	2.10	2.00	2.00	2.00	1.79	2.21	2.21
10	2.32	2.21	2.32	2.44	2.32	2.21	2.21	1.89	2.10	2.00	2.21	2.00
11	2.21	2.21	2.44	2.32	2.21	1.58	2.00	1.89	2.00	1.89	2.21	1.89
12	2.00	2.00	2.55	2.44	2.21	1.68	2.00	2.00	2.00	2.00	2.21	1.89
13	2.10	2.00	2.55	2.44	2.21	1.58	2.00	2.00	1.89	1.89	2.21	2.32
14	2.21	2.10	2.44	2.21	1.89	1.58	1.89	2.00	1.89	1.89	2.21	2.32
15	2.21	2.00	2.44	2.32	2.00	1.68	1.58	2.00	1.79	2.00	2.21	2.21
16	3.54	2.21	2.44	2.21	2.21	1.79	1.49	1.68	2.21	1.79	2.21	2.10
17	3.54	2.21	2.44	2.55	2.21	1.68	1.49	1.68	2.00	1.49	2.21	2.21
18	2.32	2.21	3.67	2.44	2.00	2.44	1.49	1.68	2.55	1.79	2.21	2.21
19	2.32	2.32	2.21	2.44	2.21	2.32	1.49	2.67	2.91	2.00	2.21	2.10
20	2.32	2.55	2.21	2.44	2.00	2.21	1.49	2.32	2.91	1.89	2.21	2.10
21	2.21	2.32	2.79	2.44	2.00	2.00	1.58	2.00	2.21	2.00	2.10	2.21
22	2.21	2.32	2.79	2.44	2.00	2.32	1.49	2.00	2.21	2.00	1.89	2.21
23	2.21	2.44	2.91	2.21	2.00	2.32	2.00	2.00	2.32	2.00	2.00	2.21
24	2.21	2.44	2.67	2.21	2.00	2.00	2.00	2.00	2.21	2.21	2.10	2.21
25	2.21	3.03	2.55	2.21	1.79	2.00	2.00	2.00	2.67	2.21	2.00	2.21
26	2.21	2.44	2.67	2.21	1.79	2.00	1.89	2.00	2.91	2.10	2.00	2.21
27	2.21	2.32	2.67	2.44	1.79	2.21	1.89	2.21	2.67	2.21	2.00	2.21
28	2.21	2.55	2.44	2.44	2.32	2.00	1.89	2.10	2.67	2.44	2.00	2.21
29	2.21		2.67	2.44	2.32	2.00	2.00	2.21	2.67	2.21	2.10	2.21
30	2.21		2.44	2.21	2.32	2.00	2.00	2.32	2.21	2.21	2.44	2.21
31	2.21		2.44		2.21		2.00	2.32		2.21		2.91
Sum	72.49	63.77	79.15	72.47	66.80	59.49	59.82	64.06	69.12	62.01	67.68	67.51

Month	Current Year 1969							Period 1943-1969			
	Extreme Gage Feet		β Extreme Second Feet		Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	High			Low	Average	Maximum	Minimum	
					Day	Day					
Jan.	0.44	0.28	15	3.93	† 1	2.00	2.34	144	406	2,790	99
Feb.	.37	.28	25	3.03	† 12	2.00	2.28	126	368	2,822	100
Mar.	.42	.30	18	3.67	† 19	2.21	2.55	157	414	3,154	111
Apr.	.34	.30	† 5	2.67	† 14	2.21	2.42	144	446	2,222	97
May	.32	.26	† 4	2.44	† 25	1.79	2.15	132	342	1,799	73
June	.32	.24	18	2.44	† 11	1.58	2.00	118	339	1,686	61
July	.32	.23	† 2	2.44	† 16	1.49	1.93	119	310	1,712	59
Aug.	.34	.25	19	2.67	† 16	1.68	2.07	127	373	1,672	83
Sept.	.36	.26	† 19	2.44	15	1.79	2.30	137	350	1,406	91
Oct.	.32	.23	28	2.44	17	1.49	2.00	123	380	1,845	102
Nov.	.35	.27	† 12	2.79	22	1.89	2.26	134	388	2,080	86
Dec.	.36	.27	31	2.91	† 11	1.89	2.18	134	357	1,686	80
Yearly	0.44	0.23		3.93		1.49	2.20	1,595	4,473	22,146	1,251

β Mean daily † And other days

NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the right (east) bank of the river in the limits of the city of Calexico, California, 1,400 feet downstream (north) of the international land boundary between the United States and Mexico. Measurements are made from a foot bridge at the gage.

RECORDS: Based on a continuous record of gage heights and weekly current meter measurements, supplemented by additional measurements during periods of high flow by the Imperial Irrigation District. Measurements are also made generally once each month by the United States Section of the Commission. Records computed and furnished by the District. 1969 records good. Records available: June 1942 through 1969.

REMARKS: The New River flows northward from Mexico into the United States and thence into the Salton Sea. The flow at this station normally comprises 1) a portion of the waste and drainage water from the irrigation system in the Mexicali Valley, and 2) sewage and other wastes from Mexicali, Baja California. Flood waters enter the river from local drainage in Mexico and such waters can reach damaging rates during violent desert storms. Waste flows from the Mexican system of canals are limited to an average annual quantity of 35,000 acre-feet during any successive five-year period under the provisions of Minute No. 197 of the Commission.

EXTREMES: Maximum mean daily discharge, 691 second-feet on December 3, 1962; minimum mean daily discharge, 2 second-feet on May 14, 1945. Prior to the period of record, and since 1900, much higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a considerable part of its flow passed through the New River channel.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	121	141	132	168	173	135	131	148	134	127	108	103
2	123	139	134	169	169	137	132	151	138	124	107	111
3	123	138	133	164	163	132	134	151	137	121	120	115
4	123	131	141	162	160	129	131	153	141	117	125	117
5	120	124	149	161	163	127	131	146	139	112	127	121
6	119	124	151	160	160	127	133	145	187	115	119	120
7	120	123	152	162	158	123	135	148	150	113	125	118
8	125	122	157	165	162	123	137	152	149	108	118	118
9	133	123	160	168	164	121	137	156	151	107	141	115
10	134	124	165	168	165	118	134	155	151	107	125	114
11	124	120	159	163	164	118	133	159	146	110	145	117
12	117	116	204	159	169	117	131	154	153	115	214	118
13	132	119	207	160	168	120	128	149	154	121	209	116
14	188	121	210	161	169	126	126	146	152	116	174	116
15	278	128	199	162	171	122	123	142	156	109	176	120
16	250	130	177	164	172	126	122	150	156	107	179	119
17	219	130	169	168	174	117	131	138	157	105	167	120
18	206	145	164	166	175	112	137	137	157	104	174	122
19	197	162	170	166	186	112	140	145	157	103	148	125
20	192	160	169	164	210	109	145	151	156	104	136	125
21	187	159	159	168	205	108	151	153	153	104	124	124
22	180	157	135	169	185	108	149	158	153	107	117	124
23	172	153	98	171	181	108	143	161	143	107	112	123
24	167	151	94	171	169	112	144	161	134	106	110	121
25	160	149	195	171	163	121	139	166	131	104	114	120
26	155	138	242	172	162	128	137	161	129	104	117	122
27	154	133	213	170	146	129	138	156	133	105	114	120
28	151	129	195	173	133	128	138	157	133	107	110	119
29	144		181	177	133	131	140	143	133	111	106	119
30	145		169	179	134	135	143	140	128	113	106	122
31	143		167		135		146	135		112		123
Sum	4,902	3,789	5,150	5,001	5,141	3,659	4,219	4,657	4,391	3,425	4,065	3,688
Current Year 1969												
Month	Extreme Gage ** Feet		Current Year Second Feet				Average Second Feet	Total Acre Feet	Period 1943-1969			
	High	Low	High		Low				Average	Maximum	Minimum	
			Day	Day	Day	Day						
Jan.	40.46	41.80	15	278	12	117	158	9,723	6,995	20,160	1,751	
Feb.	41.40	41.73	19	162	12	116	135	7,515	5,729	17,845	1,258	
Mar.	40.61	42.12	26	242	24	94	166	10,215	6,213	12,960	1,008	
Apr.	41.20	41.37	30	179	12	159	167	9,919	6,389	14,489	1,390	
May	40.99	41.66	20	210	†28	133	166	10,197	5,656	10,618	629	
June	41.70	41.89	2	137	†21	108	122	7,258	4,926	9,689	1,087	
July	41.64	41.82	21	151	16	122	136	8,368	4,797	9,086	817	
Aug.	41.44	41.71	25	166	31	135	150	9,237	5,811	10,921	1,139	
Sept.	41.06	41.84	6	187	30	128	146	8,709	6,209	12,688	1,795	
Oct.	41.86	42.08	1	127	19	103	110	6,793	6,430	11,710	2,081	
Nov.	41.16	42.16	12	214	†29	106	135	8,063	6,204	12,323	2,483	
Dec.	41.89	42.12	†19	125	1	103	119	7,315	6,862	21,205	1,763	
Yearly	40.46	42.16		278		94	143	103,312	72,221	138,906	24,573	

‡ Mean daily ** Feet below mean sea level † And other days

WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

DESCRIPTION: The Potable Water Plant of Mexicali, Baja California, discharges waste water into a canal, approximately 2.5 miles long, that empties into the Rivera Drain and thence into New River, approximately 0.9 mile above the international boundary. The measurements are taken in the wasteway canal 0.4 mile above the confluence with Rivera Drain, 1.2 miles below the plant, and 1.2 miles south of the international boundary.

RECORDS: Based on 42 double current meter measurements made during the year by wading. Data obtained and furnished by the Mexican Section of the Commission. Data available: January 1968 through 1969.

REMARKS: The Potable Water Plant is operated by the State Commission of Public Services of Mexicali and water is obtained from the West Main Canal which is a part of Mexico's system of canals in the Colorado River Irrigation District. The plant was completed in 1963 and began operation on September 28, 1963. Prior to 1968, the volumes wasted were small and infrequent.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.2	2.8	3.9	2.1	3.2	3.9	3.5	2.5	2.8	1.8	2.1	2.8
2	3.2	2.8	3.9	2.1	3.2	3.9	3.9	2.5	2.8	2.1	2.1	2.5
3	3.5	2.8	4.2	2.1	3.5	3.9	4.2	2.5	2.8	2.1	2.1	2.5
4	3.5	2.8	4.6	2.1	3.5	3.9	3.9	2.8	2.8	2.5	2.1	2.1
5	3.5	2.8	4.9	2.1	3.5	3.9	3.9	2.8	2.8	2.5	2.1	2.1
6	3.5	2.8	5.3	2.1	3.5	3.5	3.5	2.8	2.5	2.8	2.1	1.8
7	3.5	2.8	5.3	2.1	3.5	3.5	3.2	2.8	2.5	2.8	2.1	1.8
8	3.9	2.8	5.7	2.1	3.5	3.5	3.2	2.8	2.5	3.2	2.1	2.1
9	3.9	2.8	6.0	2.1	3.9	3.5	2.8	3.2	2.5	3.2	2.1	2.1
10	3.9	2.8	6.4	2.1	4.2	3.5	2.8	3.2	2.1	2.8	2.1	2.1
11	3.9	3.2	6.0	2.1	4.6	3.5	3.2	3.2	2.1	2.8	2.1	2.1
12	3.9	3.2	43.8	2.1	4.9	3.5	3.2	3.2	2.1	2.8	1.8	2.5
13	3.5	3.2	42.0	2.1	5.7	3.5	3.5	3.5	2.1	2.8	1.8	2.5
14	3.5	3.2	44.8	2.1	6.0	3.5	3.5	3.5	2.1	2.5	1.8	2.5
15	3.2	3.2	29.0	2.1	6.4	3.2	3.5	3.5	2.1	2.5	1.8	2.5
16	3.2	3.2	3.9	1.8	6.7	3.2	3.9	3.9	1.8	2.5	2.1	2.5
17	2.8	3.2	3.5	1.8	6.4	3.2	3.9	3.9	1.8	2.1	2.1	2.1
18	2.8	3.2	3.5	1.8	6.4	3.2	3.5	4.2	1.8	2.1	2.5	2.1
19	2.8	3.2	3.2	1.8	6.0	3.2	3.5	4.2	1.8	2.1	2.8	2.1
20	2.5	2.8	3.2	1.8	5.7	3.2	3.2	3.9	1.8	2.1	3.2	2.1
21	2.5	2.8	2.8	2.1	5.7	3.2	3.2	3.9	2.1	1.8	3.2	2.1
22	2.1	2.8	2.8	2.1	5.3	3.2	2.8	3.5	2.1	1.8	3.5	2.5
23	2.1	2.8	2.5	2.5	4.9	3.2	2.8	3.5	2.1	1.8	3.5	2.5
24	1.8	2.8	2.5	2.5	4.6	3.2	2.8	3.2	2.1	1.8	3.5	2.8
25	1.8	3.2	30.0	2.8	4.6	2.8	2.8	3.2	2.1	1.8	3.5	2.8
26	2.1	3.2	81.9	2.8	4.2	2.8	2.8	3.2	2.1	1.8	3.2	3.2
27	2.1	3.5	48.0	3.2	4.2	2.8	2.5	3.2	2.1	1.8	3.2	3.2
28	2.1	3.5	25.1	3.2	4.2	2.8	2.5	3.2	1.8	1.8	3.2	3.2
29	2.5		6.0	3.2	4.2	3.2	2.5	3.2	1.8	1.8	3.2	2.8
30	2.8		2.1	3.2	3.9	3.5	2.5	3.5	1.8	1.8	2.8	2.8
31	2.8		2.1		3.9		2.5	2.8		2.1		2.5
Sum	92.4	84.2	438.9	68.1	144.0	100.9	99.5	101.3	65.7	70.2	75.8	75.3
Current Year 1969								Period 1968-1969				
Month	Extreme Gage Feet		Ø Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	High		Low				Average	Maximum	Minimum	
Jan.			† 8	3.9	25	1.8	2.8	183	190	196	183	
Feb.			† 27	3.5	† 1	2.8	3.2	167	162	167	157	
Mar.			26	81.9	† 30	2.1	14.1	871	501	871	132	
Apr.			† 27	3.2	† 16	1.8	2.1	135	185	233	135	
May			16	6.7	† 1	3.2	4.6	286	281	286	274	
June			† 1	3.9	† 25	2.8	3.5	200	201	203	198	
July			3	4.2	† 27	2.5	3.2	198	225	253	200	
Aug.			† 18	4.2	† 1	2.5	3.2	200	242	282	200	
Sept.			† 1	2.8	† 16	1.8	2.1	131	263	396	131	
Oct.			† 8	3.2	† 1	1.8	2.1	139	182	226	139	
Nov.			† 22	3.5	† 12	1.8	2.5	151	178	205	151	
Dec.			† 26	3.2	† 6	1.8	2.5	149	168	186	149	
Yearly				81.9		1.8	3.9	2,810	2,778	2,810	2,745	

Ø Mean daily † And other days

WISTERIA WASTEWAY TO NEW RIVER IN MEXICO

DESCRIPTION: Staff gage located near operator's house upstream from wasteway gates, 1,000 feet downstream from the confluence of the Cerro Prieto and West Main Canals of the Colorado River Irrigation District in Colonia Wisteria, 4.3 miles upstream from the international boundary, 1.9 miles east of the highway to Tijuana at the Tijuana-San Felipe junction, 3.0 miles west of the highway to San Felipe, and 3.1 miles south of Mexicali. The wasteway structure is composed of three rectangular gates, two of which operate manually and one automatically.

RECORDS: Based on gate openings and water surface elevations upstream from the wasteway gates obtained by the Ministry of Hydraulic Resources and 44 check measurements during the year at various locations by the Mexican Section of the Commission. Records computed and furnished by the Mexican Section of the Commission. Records available: January 1951 through 1969. Records reported below are part of the waste flows from the Mexican system of canals discharging into the territory of the United States, which wastes are not to exceed an average annual quantity of 35,000 acre-feet during any successive five-year period under the provisions of Minute No. 197 of the Commission.

EXTREMES: Maximum instantaneous discharge, 675 second-feet on January 24, 1962; minimum discharge, no flow on various occasions.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	.7	.4	0	0	0	0	0	0	0	.7
2	0	0	.7	.4	0	0	0	0	0	0	0	.7
3	0	0	.7	.4	0	0	0	0	0	0	.4	.4
4	0	0	.7	.4	0	0	0	0	0	0	.4	.4
5	0	0	.7	.4	0	0	0	0	0	0	.4	0
6	0	0	.7	.4	0	0	0	0	0	0	.4	0
7	0	0	1.1	.4	0	0	0	0	0	0	.4	0
8	0	0	1.1	.4	0	0	0	0	0	0	.7	0
9	0	0	1.1	.4	0	0	0	0	0	0	.7	0
10	0	0	1.1	.4	0	0	0	0	0	0	.7	0
11	0	0	1.1	.4	0	0	0	0	0	0	.7	0
12	0	0	1.1	.4	0	0	0	0	0	0	.7	0
13	0	0	1.1	.4	0	0	0	0	0	0	1.1	0
14	0	0	.7	.4	0	0	0	0	0	0	1.1	0
15	0	0	.7	.4	0	0	0	0	0	0	1.1	0
16	0	0	.7	0	0	0	0	0	0	0	1.1	0
17	0	0	.7	0	0	0	0	0	0	0	1.4	0
18	0	.4	.7	0	0	0	0	0	0	0	1.4	0
19	.4	.4	.7	0	0	0	0	0	0	0	1.4	0
20	.4	.4	.7	0	0	0	0	0	0	0	1.4	0
21	.4	.4	.7	0	0	0	0	0	0	0	1.8	0
22	.4	.7	.7	0	0	0	0	0	0	0	1.8	0
23	.4	.7	.7	0	0	0	0	0	0	0	1.8	0
24	.4	.7	.7	0	0	0	0	0	0	0	1.4	0
25	.4	.7	.7	0	0	0	0	0	0	* 0	1.4	0
26	.4	.7	.7	0	0	0	0	0	0	* 0	1.4	0
27	.4	.7	.7	0	0	0	0	0	0	* 0	1.4	0
28	0	.7	.4	0	0	0	0	0	0	* 0	1.1	0
29	0		.4	0	0	0	0	0	0	* 0	1.1	0
30	0		.4	0	0	0	0	0	0	* 0	1.1	0
31	0		.4	0	0	0	0	0	0	* 0	1.1	0
Sum	3.6	5.1	22.6	6.0	0	0	0	0	0	0	29.8	2.2
Current Year 1969								Period 1951-1969				
Month	Extreme Gage Feet		Ø Current Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High		Low			Average	Maximum	Minimum	
				Day	Day		Day					
Jan.			†19	.4	† 1	0	0	6.3	1,818	8,735	0	
Feb.			22	.7	† 1	0	.4	12.6	1,129	7,218	0	
Mar.			† 7	1.1	† 28	.4	.7	45.6	838	2,568	0	
Apr.			† 1	.4	† 16	0	.4	10.5	811	4,433	0	
May			† 1	0	† 1	0	0	0	571	1,892	0	
June			† 1	0	† 1	0	0	0	336	1,450	0	
July			† 1	0	† 1	0	0	0	264	2,040	0	
Aug.			† 1	0	† 1	0	0	0	512	1,926	0	
Sept.			† 1	0	† 1	0	0	0	711	2,915	0	
Oct.			† 1	0	† 1	0	0	0	972	2,993	0	
Nov.			† 21	1.8	† 1	0	1.1	58.1	1,086	3,768	0	
Dec.			† 1	.7	† 5	0	0	4.2	1,596	8,669	0	
Yearly				1.8		0	.4	138	10,644	27,083	138	

* Estimated Ø Mean daily † And other days

WISTERIA DRAIN TO NEW RIVER IN MEXICO

DESCRIPTION: Wisteria Drain discharges into the stilling basin above the weir of Wisteria Wasteway immediately downstream from the spillway structure of Cerro Prieto and West Main Canals through a 20-inch pipe and thence into New River. The pipe outlet is located in the right bank of the basin in Colonia Wisteria, 4.3 miles upstream from the international boundary, and about 1.9 miles east of the Tijuana highway from the Tijuana-San Felipe junction.

RECORDS: Based on weekly readings of water surface elevations, discharges are computed from horizontal pipe formula. Data furnished by the Mexican Section of the Commission. The operation of this station ended December 6, 1969. Records available: January 1957 through December 6, 1969.

EXTREMES: Maximum mean daily discharge, 2.5 second-feet, November 22, 1969; minimum, no flow on various occasions. Maximum monthly volume, 63.7 acre-feet, January 1968; minimum monthly volume, zero on various occasions.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	.4
2	0	0	0	0	0	0	0	0	0	0	0	.4
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	.4	0
6	0	0	0	0	0	0	0	0	0	0	.4	0
7	0	0	0	0	0	0	0	0	0	0	.4	*
8	0	0	0	0	0	0	0	0	0	0	.4	
9	0	0	0	0	0	0	0	0	0	0	.4	
10	0	0	0	0	0	0	0	0	0	0	.4	
11	0	0	0	0	0	0	0	0	0	0	.4	
12	0	0	0	0	0	0	0	0	0	0	.4	
13	0	0	0	0	0	0	0	0	0	0	.4	
14	0	0	0	0	0	0	0	0	0	0	.4	
15	0	0	0	0	0	0	0	0	0	0	.4	
16	0	0	0	0	0	0	0	0	0	0	.7	
17	0	0	0	0	0	0	0	0	0	0	1.1	
18	0	0	0	0	0	0	0	0	0	0	1.4	
19	0	0	0	0	0	0	0	0	0	0	1.4	
20	0	0	0	0	0	0	0	0	0	0	1.8	
21	0	0	0	0	0	0	0	0	0	0	2.1	
22	0	0	0	0	0	0	0	0	0	0	2.5	
23	0	0	0	0	0	0	0	0	0	0	2.1	
24	0	0	0	0	0	0	0	0	0	0	1.8	
25	0	0	0	0	0	0	0	0	0	0	1.4	
26	0	0	0	0	0	0	0	0	0	0	1.4	
27	0	0	0	0	0	0	0	0	0	0	1.1	
28	0	0	0	0	0	0	0	0	0	0	.7	
29	0	0	0	0	0	0	0	0	0	0	.4	
30	0	0	0	0	0	0	0	0	0	0	.4	
31	0	0	0	0	0	0	0	0	0	0	0	
Sum	0	0	0	0	0	0	0	0	0	0	24.7	.8
Current Year 1969								Period 1957-1969				
Month	Extreme Gage Feet		Extreme Second Feet			Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	High	Day	Low			Average	Maximum	Minimum		
Jan.			0		0	0	0	28.1	63.7	0		
Feb.			0		0	0	0	21.2	40.6	0		
Mar.			0		0	0	0	22.9	52.5	0		
Apr.			0		0	0	0	26.8	47.7	0		
May			0		0	0	0	15.4	28.7	0		
June			0		0	0	0	13.4	27.6	0		
July			0		0	0	0	13.2	35.7	0		
Aug.			0		0	0	0	14.9	55.9	0		
Sept.			0		0	0	0	11.2	31.5	0		
Oct.			0		0	0	0	10.4	26.6	0		
Nov.			22		0	.7	47.7	17.8	47.7	0		
Dec.			†1		.4	†3	0	18.7	49.0	0		
Yearly			2.5		0	0	49.0	214	357	49.0		

* The end of operation

‡ Mean daily

† And other days

WASTE WATERS FROM MEXICAN SYSTEM OF CANALS ENTERING THE UNITED STATES

DESCRIPTION: During 1969, the discharge to the New River in Mexico was from Wisteria Wasteway, located 2.9 miles upstream from the international boundary in Colonia Wisteria, and from the Mexicali Potable Water Plant which discharges, by canal, into the Rivera Drain thence to New River.

RECORDS: Computations of flows from Wisteria Wasteway are based on gate openings and water-stage elevations upstream from the wasteway made by the Ministry of Hydraulic Resources, and of weekly measurements taken downstream from the weir by the Mexican Section of the Commission. Computation of flows from the Potable Water Plant are based on weekly readings from the discharge canal. Data obtained and furnished by the Mexican Section of the Commission. Records available: Wisteria Wasteway, January 1951 through 1969; Sifón Wasteway, January 1952 through April 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through 1969.

REMARKS: Mean daily discharges for Wisteria Wasteway and the Potable Water Plant are shown on pages 59 and 58, respectively in this bulletin. Records for Pueblo Nuevo and Sifón Wasteways are shown in previously published bulletins, 1960 through 1965; flows from these two Wasteways are used for irrigation and no longer reach New River.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1956-1969		
		Average	Maximum	Minimum
January	190	1,774	8,758	15.4
February	180	1,188	7,281	19.6
March	916	731	2,610	21.7
April	146	516	2,843	16.1
May	286	343	1,141	9.1
June	200	244	1,477	0
July	198	148	348	0
August	200	367	1,413	0
September	131	446	2,081	21.0
October	139	615	2,024	8.4
November	208	912	3,784	0
December	153	1,667	8,691	0
Yearly	2,947	8,953	27,430	399

SALTON SEA - ELEVATIONS OF WATER SURFACE

DESCRIPTION: Water-stage recorder and staff gage located on the western shore of the Salton Sea, 15.5 miles northwest of Westmoreland, California. The Salton Sea is situated in Imperial and Riverside counties of California in the United States, 125 miles northwest of the Gulf of California, 18 miles northwest of Brawley, California, and 42 miles north of the international boundary between the United States and Mexico. The sea lies in the bottom of a closed basin known as the Salton Sink, which has a drainage area of 8,360 square miles. Zero of gage is 250.00 feet below mean sea level, U. S. C. & G. S. datum.

RECORDS: Records of water surface elevations available from November 1904 through 1969. From January 1925 to October 22, 1951, records were collected by Imperial Irrigation District and based generally upon one water surface reading each month, determined from a bench mark at Figtree John's Spring about 22 miles northwest along the western shore from the present gage. Since October 24, 1951, a continuous record of gage heights has been obtained by the U. S. Geological Survey at a new gaging station published as "Salton Sea near Westmoreland, California." The elevation of the old station is at a datum of one foot higher than that of the present station, therefore to make the records comparable it is necessary to subtract one foot from the elevations of the records obtained at the old station. All records reported below and the area and capacity table are adjusted to the datum of the present station. The area and capacity table, dated January 8, 1965, is based on resurveys made in 1957 above elevation -240 feet and in 1962 below elevation -236 feet.

REMARKS: Runoff from the basin, irrigation drainage and waste water from Imperial and Coachella Valleys in the United States, and drainage and waste water from part of the Mexicali Valley in Mexico discharge into the Salton Sea. Water from Mexico enters the United States in the Alamo River and New River channels. The bottom of the sea is 277.7 feet below mean sea level, U. S. C. & G. S. datum.

EXTREMES: Maximum elevation during year, 231.7 feet below mean sea level. Minimum elevation during year, 232.9 feet below mean sea level. Prior to 1935, and since the sea was filled by flood waters of the Colorado River 1905-1906, maximum elevation 195.9 feet below mean sea level (present datum), February 10 to March 29, 1907; minimum elevation 251.6 feet below mean sea level in November 1924.

Mean Daily Water Surface Elevation in Feet below Mean Sea Level - 1969

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	232.6	232.2	232.0	231.7	231.8	231.8	232.0	232.2	232.5	232.7	232.8	232.7
2	232.6	232.2	232.0	231.7	231.8	231.8	232.0	232.2	232.5	232.7	232.8	232.7
3	232.6	232.2	232.0	231.7	231.8	231.9	232.0	232.2	232.5	232.7	232.8	232.7
4	232.6	232.2	232.0	231.7	231.8	231.9	232.0	232.2	232.5	232.7	232.8	232.7
5	232.6	232.2	232.0	231.7	231.8	231.9	232.0	232.2	232.5	232.7	232.8	232.7
6	232.6	232.2	231.9	231.7	231.8	231.9	232.0	232.2	232.5	232.7	232.8	232.7
7	232.6	232.2	231.9	231.7	231.8	231.9	232.0	232.2	232.5	232.7	232.8	232.7
8	232.5	232.2	231.9	231.7	231.8	231.9	232.1	232.2	232.5	232.8	232.8	232.7
9	232.5	232.2	231.9	231.7	231.8	231.9	232.1	232.2	232.5	232.8	232.8	232.7
10	232.5	232.2	231.9	231.7	231.8	231.9	232.1	232.2	232.5	232.8	232.7	232.7
11	232.5	232.2	231.9	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.7	232.7
12	232.5	232.2	231.9	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.7	232.7
13	232.5	232.2	231.9	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.7	232.7
14	232.5	232.1	231.9	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.7	232.7
15	232.4	232.1	231.9	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.7	232.7
16	232.4	232.1	231.9	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.7	232.7
17	232.4	232.1	231.8	231.7	231.8	231.9	232.1	232.3	232.5	232.8	232.6	232.7
18	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.3	232.6	232.9	232.6	232.7
19	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.3	232.6	232.9	232.7	232.7
20	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.3	232.6	232.9	232.8	232.7
21	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.4	232.6	232.9	232.8	232.7
22	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.4	232.6	232.9	232.8	232.7
23	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.4	232.6	232.9	232.7	232.7
24	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.4	232.6	232.9	232.7	232.6
25	232.3	232.1	231.8	231.7	231.8	231.9	232.1	232.4	232.6	232.8	232.7	232.6
26	232.2	232.1	231.8	231.7	231.8	231.9	232.1	232.4	232.7	232.8	232.7	232.6
27	232.2	232.1	231.8	231.8	231.8	231.9	232.1	232.4	232.7	232.8	232.7	232.6
28	232.2	232.0	231.8	231.7	231.8	231.9	232.1	232.4	232.7	232.8	232.7	232.6
29	232.2		231.8	231.7	231.8	231.9	232.1	232.4	232.7	232.8	232.7	232.6
30	232.2		231.8	231.8	231.8	231.9	232.1	232.4	232.7	232.8	232.7	232.6
31	232.2		231.7	231.8	231.8		232.1	232.4	232.7	232.8	232.7	232.6
Avg.	232.40	232.14	231.86	231.71	231.80	231.89	232.08	232.30	232.56	232.80	232.73	232.68

Month	Current Year 1969		Period 1935-1969			Area and Capacity Table		
	Ø Extreme Elev. Feet		Elevation Feet			Elevation	Area	Capacity
	High	Low	# Average	# Maximum	F Minimum	Feet below M. S. L.	Acres	Acre-Feet
Jan.	232.2	232.6	238.99	232.05	249.3	277.7	0	0
Feb.	232.0	232.2	238.67	231.79	248.8	274.0	20,600	25,700
Mar.	231.7	232.0	238.40	231.57	248.6	270.0	62,900	188,700
Apr.	231.7	231.8	238.21	231.39	248.7	266.0	94,600	510,600
May	231.8	231.8	238.21	231.54	248.5	260.0	122,600	1,170,000
June	231.8	231.9	238.38	231.71	248.8	256.0	134,700	1,684,000
July	232.0	232.1	238.54	231.92	249.1	252.0	148,800	2,250,000
Aug.	232.2	232.4	238.74	232.17	249.4	244.0	179,700	3,562,000
Sept.	232.5	232.7	238.93	232.49	249.4	240.0	196,900	4,315,000
Oct.	232.7	232.9	239.01	232.49	249.8	235.0	221,800	5,360,000
Nov.	232.6	232.8	238.99	232.30	250.0	230.0	235,800	6,504,000
Dec.	232.6	232.7	238.83	232.23	249.6	220.0	262,000	8,993,000
						210.0	288,500	11,740,000
						200.0	315,500	14,760,000
Yearly	231.7	232.9	238.66	232.06	250.0			

Ø Mean daily # Mean monthly F Reading near first day of month

CHEMICAL ANALYSES OF WATER SAMPLES

1969

The tables below are based on four samples from the Alamo and New Rivers taken and analyzed by the State of California Department of Water Resources.

Samples from the Alamo River are taken near the international boundary upstream from seepage pipes from the All-American Canal. Samples from New River are taken from the right bank at road bridge 450 feet north of international boundary. Records of sampling extend from April 1951 through 1969.

To convert milligram equivalents to parts per million by weight, multiply each ion by its appropriate conversion factor. These factors are: Ca, 20.04; Mg, 12.16; Na, 22.99; (CO₂ plus HCO₃) expressed as CO₃, 30.00; SO₄, 48.03; Cl, 35.45; NO₃, 62.00. To convert tons per acre-foot to parts per million, multiply tons per acre-foot by 735.5. Electrical conductivity, reported in the tables as ECx10⁶ at 25°C, is a relative measure of the total salt concentration.

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

Alamo River

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	3.27		3,483	0.94	7.9	59	48	8.33	7.23	22.53	4.34	15.52	18.19	0.05
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	3.80		4,098	1.03	7.5	56	48	9.78	9.29	24.80	4.57	18.32	21.07	.06
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	4.36		4,721	1.26	7.6	57	52	11.03	10.69	29.49	4.99	19.76	26.79	.06
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	4.94		5,325	1.40	7.9	59	52	11.58	11.34	33.93	6.08	20.92	29.33	.08
Total	4														

New River

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	5.99		6,609	1.6	7.2	68	72	12.03	9.21	48.55	4.28	15.16	51.61	0.18
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	7.00		8,071	2.1	7.1	70	76	11.78	9.62	57.86	3.91	15.44	61.76	.21
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	6.64		7,776	2.1	7.2	70	76	11.78	9.21	56.64	3.78	15.38	60.35	.04
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.	1	6.95		8,403	2.9	7.2	72	80	11.63	9.04	62.64	10.41	6.49	68.39	.02
Total	4														

** Percent of total cations

*** Percent of total anions

ELECTRICAL CONDUCTIVITY OF WATER SAMPLES

1969

The following tables show electrical conductivity expressed in mhos per centimeter cube x 10⁶ at 25°C of individual water samples from the New River in Mexico at the international boundary and from the wasteway canal at the Potable Water Plant in Mexicali, Baja California. Samples from the New River and from the Potable Water Plant are taken by the Mexican Section of the Commission and determinations are made by the Ministry of Hydraulic Resources of Mexico.

Electrical conductivity is a relative indication of the concentration of dissolved solids in the water samples.

Date	ECx10 ⁶ @25°C										
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New River at International Boundary

January	February	March	May	July	August	October	November
4 6,400	15 7,500	31 7,500	16 8,250	9 8,500	20 8,100	1 7,900	29 8,500
11 6,500	24 7,250	April	26 8,000	16 8,500	22 8,000	15 9,000	December
25 6,500	March	11 7,250	June	22 8,500	September	24 8,000	6 8,000
31 7,250	3 7,500	19 7,500	9 8,750	31 8,000	4 7,500	November	13 9,000
February	10 6,500	28 8,500	21 8,500	August	11 8,500	15 7,500	20 7,400
7 6,500	17 7,200	May	July	6 8,500	19 7,500	22 9,500	27 8,750
	24 7,500	8 8,000	3 8,500	15 8,000	23 7,750		30 9,000

Mexicali Potable Water Plant to New River

January	February	April	June	July	August	October	November
4 2,050	24 2,000	11 2,050	9 2,200	16 2,000	25 2,100	1 1,700	22 1,900
11 2,000	March	19 2,200	20 2,150	22 2,100	September	8 1,400	29 2,100
25 2,200	3 2,200	28 2,150	28 2,150	31 2,000	4 2,100	15 1,900	December
31 2,400	10 2,000	May	July	August	11 2,100	22 1,800	6 2,000
February	17 2,050	8 2,150	3 2,200	6 2,000	19 2,000	November	13 2,200
7 2,200	24 2,000	16 2,050	9 2,100	15 2,050	23 1,900	7 1,700	20 2,000
15 1,950	31 2,000	26 2,000		18 2,100		15 1,700	27 2,000

COTTONWOOD CREEK ABOVE MORENA DAM, CALIFORNIA

DESCRIPTION: Staff gage located on east side of outlet tower immediately upstream from face of Morena Dam. The dam is located on Cottonwood Creek 1.8 miles upstream from the mouth of Hauser Creek, 8.5 miles upstream from Barrett Dam, and about 20 miles upstream from the international boundary. Zero of gage is 2,882.4 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Reservoir inflows shown below were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall, by the International Boundary and Water Commission, United States Section. They represent all water reaching Morena Reservoir, including rainfall on reservoir water surface. Basic data were furnished by the city of San Diego, California. Records available: April 1911 through 1969.

REMARKS: Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 1969 computed on basis of area-capacity curves determined from 1948 re-survey. Various changes have been made to the spillway section since construction of the dam. Elevation of present crest of ungated spillway is 157.00 feet, gage datum. Reservoir capacity at spillway crest, 1948 survey, is 50,210 acre-feet. The entire capacity of Morena Reservoir is used to furnish a part of the water supply of the city of San Diego, California. Water is released from Morena Reservoir down Cottonwood Creek to Barrett Reservoir as required.

EXTREMES: Prior to 1937, maximum monthly inflow, 37,200 acre-feet, January 1916; minimum, no flow during parts of many years. Reference table below for extremes since 1937.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1937-1969		
		Average	Maximum	Minimum
January	661	484	3,520	4.8
February	2,823	1,196	16,700	8.0
March	2,082	1,776	13,220	19.3
April	823	1,129	11,490	3.3
May	350	400	3,550	0
June	76.3	203	1,660	0
July	38.2	144	1,010	0
August	16.2	102	1,260	0
September	.5	71.0	1,070	0
October	0	82.9	1,270	0
November	44.6	153	1,380	0
December	26.1	503	3,590	4.4
Yearly	6,940.9	6,243.9	39,439	121

COTTONWOOD CREEK BELOW MORENA DAM, CALIFORNIA

DESCRIPTION: Two water-stage recorders, one on the upstream side of the southeast abutment of Morena Dam for measuring head on the spillway crest and one immediately below the dam with a rectangular control weir for measuring ordinary reservoir releases, and cableway located about 0.8 mile downstream from the dam. Discharge measurements made at the cableway include leakage, controlled releases, and spillway discharges.

RECORDS: Monthly records shown below represent the water available immediately below Morena Dam, consisting of spillway waste, draft, and leakage from the dam. They are computed by the International Boundary and Water Commission, United States Section, from basic data furnished by the city of San Diego, California. Records available: January 1911 through 1969.

REMARKS: Flows at this station are regulated by Morena Dam; storage began March 1910. Water is released from Morena Reservoir as required and flows down the natural channel of Cottonwood Creek to Barrett Reservoir. There are no major diversions above Morena Dam.

EXTREMES: Prior to 1937, maximum monthly discharge, 21,400 acre-feet, February 1916; minimum, zero during December 1936.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1937-1969		
		Average	Maximum	Minimum
January	2.5	131	1,700	1
February	366	369	4,260	1.5
March	1,731	300	1,731	1.7
April	.9	915	12,950	.9
May	.4	250	3,040	.4
June	.3	343	7,360	0
July	.2	195	2,340	.2
August	.2	162	1,550	.2
September	.5	317	5,880	0
October	.3	95.3	529	0
November	9.0	128	1,260	0
December	9.0	354	5,350	1
Yearly	2,120.3	3,559.3	24,825	15.6

COTTONWOOD CREEK ABOVE BARRETT DAM, CALIFORNIA

DESCRIPTION: Staff gage located immediately upstream from face of dam on west side of outlet tower. Barrett Dam is located on Cottonwood Creek 8.5 miles downstream from Morena Dam, 1 mile downstream from the mouth of Pine Valley Creek and about 12 miles upstream from the international boundary. Zero of gage is 1,446.12 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Records reported below represent all water reaching Barrett Dam from the sub-basin below Morena Dam including rainfall on the reservoir water surface. Leakage, releases and spills from Morena Reservoir are not included. The inflows were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation and rainfall furnished by the city of San Diego, California. Records available: January 1921 through 1969. Records of stream flow for a station at the dam site are also available for the periods 1906-1915 and 1917-1920.

REMARKS: Storage began at Barrett Reservoir in January 1921. The area-capacity-elevation curves used in the inflow calculations are dated 1948, 1951, and 1955, and were furnished by the city of San Diego. Capacity of reservoir at top of flash gates on spillway (gage height 168.88 feet) is 44,755 acre-feet. Capacity at spillway crest (gage height 160.88 feet) is 37,950 acre-feet. Dead storage, 719 acre-feet below lowest outlet (gage height 58.88 feet) is included in these capacities. The entire capacity of Barrett Reservoir is used to furnish a part of the water supply of the city of San Diego, California.

EXTREMES: Prior to 1937, maximum monthly discharge, 54,800 acre-feet, February 1927; minimum, no flow during several months of various years.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1937-1969		
		Average	Maximum	Minimum
January	1,737	625	3,430	5.2
February	5,746	1,733	26,790	7.6
March	5,431	2,850	18,860	14.1
April	1,279	1,892	21,630	10.2
May	613	579	5,130	0
June	1.3	233	1,730	0
July	2.9	152	1,010	0
August	0	90.7	579	0
September	55.0	105	759	0
October	31.3	65.8	645	.1
November	77.1	137	1,200	0
December	46.8	510	3,380	5.5
Yearly	15,020.4	8,972.5	59,387	129

DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.5 mile downstream from Barrett Dam on right bank of Dulzura Conduit 50 feet upstream from road crossing to Barrett Dam. Elevation of gage has not been determined.

RECORDS: Computed on basis of head on control section of flume, as measured by water-stage recorder, and rating curve determined from current meter measurements. Records obtained and furnished by the city of San Diego, California. Records available: January 1909 through 1969.

REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 1.5 miles upstream. The conduit carries diversions from Barrett Reservoir on Cottonwood Creek westerly across the divide into Otay Reservoir for municipal use by the city of San Diego. Prior to September 30, 1958, station was located 8 miles along the conduit from Barrett Dam, being reported as "Dulzura Conduit Near Dulzura" and the draft from Barrett Reservoir was computed from the discharges obtained at the conduit gaging station, multiplied by the factor 1.05 to allow for channel losses in the reach from the reservoir to the gaging station.

EXTREMES: Since 1937: Maximum mean daily discharges, 55 second-feet on March 15, 1954; minimum discharge, no flow for long periods on many occasions.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	21.6	29.6	31.5	30.5	19.7	0	0	0	0
2	0	0	0	21.6	29.8	31.3	30.5	26.3	0	0	0	0
3	0	0	0	21.6	29.8	31.1	30.5	31.7	0	0	0	0
4	0	0	0	21.6	29.6	30.9	30.5	32.0	0	0	0	0
5	0	0	0	21.6	29.6	30.9	28.7	32.4	0	0	0	0
6	0	0	0	21.6	29.6	30.5	26.5	32.2	0	0	0	0
7	0	0	0	21.6	29.6	30.5	26.5	32.0	0	0	0	0
8	0	0	0	21.8	29.6	30.7	24.4	32.0	0	0	0	0
9	0	0	0	21.8	29.6	30.9	21.4	33.0	0	0	0	0
10	0	0	0	21.8	29.6	31.7	21.4	33.9	0	0	0	0
11	0	0	0	25.1	29.6	33.4	21.4	33.2	0	0	0	0
12	0	0	0	28.4	31.1	33.2	21.2	32.4	0	0	0	0
13	0	0	0	28.6	32.6	33.2	21.2	32.0	0	0	0	0
14	0	0	0	28.6	32.6	33.0	20.1	31.7	0	0	0	0
15	0	0	0	28.6	32.8	32.8	20.1	31.5	0	0	0	0
16	0	0	0	28.6	32.8	32.6	20.1	30.9	0	0	0	0
17	0	0	0	28.6	32.8	32.4	20.1	30.7	0	0	0	0
18	0	0	0	28.4	33.0	32.4	21.2	30.5	0	0	0	0
19	0	0	0	28.4	33.0	32.4	21.4	30.5	0	0	0	0
20	0	0	4.6	28.4	33.2	32.4	21.2	30.1	0	0	0	0
21	0	0	10.7	29.0	33.4	32.2	20.8	29.6	0	0	0	0
22	0	0	14.1	29.8	33.4	32.0	20.2	29.4	0	0	0	0
23	0	0	14.1	29.8	33.9	32.0	20.0	29.4	0	0	0	0
24	0	0	16.5	29.8	34.1	31.7	19.8	29.0	0	0	0	0
25	0	0	18.2	29.8	34.1	31.7	19.7	29.0	0	0	0	0
26	0	0	20.3	29.8	34.3	31.5	19.7	28.8	0	0	0	0
27	0	0	21.8	29.6	34.3	31.5	19.7	28.4	0	0	0	0
28	0	0	21.8	29.6	33.9	31.5	19.7	15.4	0	0	0	0
29	0	0	21.8	29.6	33.4	31.5	19.7	0	0	0	0	0
30	0	0	21.8	29.6	33.4	31.5	19.7	0	0	0	0	0
31	0	0	21.8	29.6	32.4	31.5	19.7	0	0	0	0	0
Sum	0	0	207.5	794.7	990.5	954.9	697.6	837.7	0	0	0	0

Month	Current Year 1969						Period 1937-1969				
	Extreme Gage Feet		Extreme Second Feet		Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	High			Day	Average	Maximum	Minimum	
					Day	Day					
Jan.			0		0	0	430	2,350	0		
Feb.			0		0	0	433	2,130	0		
Mar.			† 27	21.8	† 1	6.7	412	580	2,330		
Apr.			† 22	29.8	† 1	21.6	26.5	878	2,860		
May			† 26	34.3	† 1	29.6	32.0	1,965	3,040		
June			11	33.4	† 6	30.5	31.8	1,894	2,920		
July			† 1	30.5	† 25	19.7	22.5	1,384	2,920		
Aug.			10	33.9	† 29	0	27.0	1,662	2,820		
Sept.			0	0	0	0	0	502	2,320		
Oct.			0	0	0	0	0	383	2,450		
Nov.			0	0	0	0	0	529	2,760		
Dec.			0	0	0	0	0	488	2,305		
Yearly				34.3		0	12.3	8,893	7,862	27,170	0

† And other days

0 Mean daily

COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located about 2.5 miles downstream from Barrett Dam and 0.5 mile upstream from Rattlesnake Canyon for measuring Barrett Dam spills, and staff gage and control weir located immediately below the dam for measuring leakage. The elevation of the gage is about 1,000 feet (from topographic map).

RECORDS: Data furnished by the city of San Diego, California. Prior to January 1953, the records were furnished by the city of San Diego and reviewed and revised by the United States Section of the Commission. The recorder is to be operated only when Barrett Reservoir is near or above spillway level. There have been no spillway discharges since May 1943. Spillway discharges included in the period record below were computed by the city of San Diego from the head on the spillway crest, read on the reservoir gage, and applied to a broad-crested weir formula. Records available: January 1921 through 1969. Storage began in Barrett Reservoir in January 1921.

REMARKS: Records reported below represent the water available in the natural channel of Cottonwood Creek immediately below Barrett Dam. Records of draft from Barrett Reservoir are not included inasmuch as all releases are made to Dulzura Conduit which transports water outside the basin. Leakage is mainly through the spillway gates.

EXTREMES: Prior to 1937, maximum monthly discharge 38,400 acre-feet February 1927; minimum, no flow during several months of various years.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1937-1969		
		Average	Maximum	Minimum
January	0	18.3	590	0
February	0	31.2	990	0
March	0	839	13,390	0
April	0	1,231	33,400	0
May	0	279	7,520	0
June	0	39.3	890	0
July	0	2.2	21	0
August	0	1.9	21	0
September	0	1.6	21	0
October	0	1.4	21	0
November	0	1.0	15	0
December	0	1.7	21	0
Yearly	0	2,447.6	50,364	0

COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located 1.6 miles upstream from the international land boundary between the United States and Mexico, 0.8 mile upstream from the confluence with Tecate Creek, and 5.1 miles south of Dulzura, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the cableway which is located 700 feet downstream from the gage. Zero of gage is 569.40 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow generally made twice each month. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1969.

REMARKS: Flow is largely controlled by Barrett and Morena Reservoirs, 10 and 18 miles, respectively, upstream from this station. During 1969 there were no releases or spills to the natural channel of Cottonwood Creek at Barrett Dam, the lowermost dam in Cottonwood Creek Basin.

EXTREMES: Maximum discharge 4,340 second-feet February 7, 1937 (gage height 9.65 feet), from rating curve extended above 1,500 second-feet by logarithmic plotting. Minimum discharge, no flow during part of each year.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	4.8	81	5.1	.30	0	0	0	0	0	0	0
2	0	3.4	73	4.8	.30	0	0	0	0	0	0	0
3	0	2.3	59	4.8	.30	0	0	0	0	0	0	0
4	0	1.9	52	4.6	.40	0	0	0	0	0	0	0
5	0	2.0	42	4.4	.50	0	0	0	0	0	0	0
6	0	9.9	35	4.4	.60	.10	0	0	0	0	0	0
7	0	12	33	4.4	.80	.10	0	0	0	0	0	0
8	0	9.1	29	4.1	.60	.10	0	0	0	0	0	0
9	0	7.4	24	3.9	.50	0	0	0	0	0	0	0
10	0	5.8	32	3.9	.30	0	0	0	0	0	0	0
11	0	5.1	50	4.1	.30	.10	0	0	0	0	0	0
12	0	4.1	32	3.9	.20	.20	0	0	0	0	0	0
13	0	3.7	47	3.7	.20	.20	0	0	0	0	0	0
14	0	3.2	51	3.6	.20	.20	0	0	0	0	0	0
15	.20	2.8	33	3.2	.20	.10	0	0	0	0	0	0
16	0	2.7	28	2.7	.10	.10	0	0	0	0	0	0
17	0	2.2	26	2.0	.10	0	0	0	0	0	0	0
18	0	4.1	24	1.7	.10	0	0	0	0	0	0	0
19	0	13	19	1.6	.10	0	0	0	0	0	0	0
20	.10	13	16	1.2	.10	0	0	0	0	0	0	0
21	1.2	16	17	1.0	.10	0	0	0	0	0	0	0
22	1.3	56	29	1.0	.10	0	0	0	0	0	0	0
23	.60	80	24	1.0	.10	0	0	0	0	0	0	0
24	6.5	76	16	.90	.10	0	0	0	0	0	0	0
25	56	112	12	.80	0	0	0	0	0	0	0	0
26	48	472	8.8	.70	0	0	0	0	0	0	0	0
27	29	160	8.3	.50	0	0	0	0	0	0	0	0
28	18	102	7.7	.40	0	0	0	0	0	0	0	0
29	13		6.9	.40	0	0	0	0	0	0	0	0
30	9.1		5.8	.40	0	0	0	0	0	0	0	0
31	6.6		5.4		0	0	0	0	0	0	0	0
Sum	189.60	1,186.5	926.9	79.20	6.60	1.20	0	0	0	0	0	0
Current Year 1969									Period 1937-1969			
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.			25	56	† 1	0	6.12	376	212	1,190	0	
Feb.			26	472	4	1.9	42.4	2,350	677	9,940	0	
Mar.			1	81	31	5.4	29.9	1,840	1,809	20,880	0	
Apr.			1	5.1	†28	.40	2.64	157	1,708	40,240	0	
May			7	.80	†25	0	.21	13	396	10,040	0	
June			†12	.20	† 1	0	.040	2.4	76.0	1,590	0	
July				0	0	0	0	0	8.4	206	0	
Aug.				0	0	0	0	0	.4	7.7	0	
Sept.				0	0	0	0	0	2.2	72	0	
Oct.				0	0	0	0	0	4.3	101	0	
Nov.				0	0	0	0	0	24.0	440	0	
Dec.				0	0	0	0	0	153	1,316	0	
Yearly				472		0	6.78	4,738.4	5,070.3	66,700	0	

‡ Mean daily

† And other days

CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.5 mile upstream from the international land boundary between the United States and Mexico, just upstream from bridge on California State Highway 94, 3.5 miles southwest of Campo, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the bridge. Zero of gage is 2,178.92 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1969.

REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station is partially regulated by a small conservation reservoir a quarter of a mile upstream, completed in August 1956.

EXTREMES: Maximum instantaneous discharge during 1969, 10.0 c.f.s. on February 26 (gage height 1.78 feet); no flow most of the year including maximum day, which was less than 0.05 c.f.s. Maximum discharge 880 second-feet, February 6, 1937 (gage height 4.80 feet, present datum), from rating curve extended above 110 second-feet on basis of velocity-depth relation and cross-section area at the control. Minimum discharge, no flow during part of most years.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	.70	1.0	.70	.60	.20	.20	.20	.17	.05	.09
2	0	0	.50	1.0	.70	.50	.20	.20	.20	.14	.05	.09
3	0	0	.40	1.0	.70	.50	.20	.20	.20	.14	.05	.09
4	0	0	.40	1.0	.80	.50	.20	.20	.20	.11	.05	.09
5	0	0	.40	1.0	.90	.50	.20	.20	.20	.11	.05	.09
6	0	0	.40	1.0	1.0	.50	.20	.20	.20	.09	.06	.09
7	0	0	.40	1.0	1.0	.60	.20	.20	.20	.09	.09	.09
8	0	0	.40	1.0	.80	.60	.20	.30	.20	.06	.09	.09
9	0	0	.40	1.0	.80	.60	.20	.20	.20	.06	.09	.09
10	0	0	2.0	1.0	.70	.60	.20	.20	.20	.06	.11	.09
11	0	0	1.3	1.0	.70	.60	.20	.20	.20	.06	.10	.09
12	0	0	1.2	1.0	.70	.70	.20	.20	.20	.06	.10	.09
13	0	0	1.3	1.0	.60	.60	.20	.20	.20	.05	.09	.09
14	0	0	1.2	1.0	.60	.50	.20	.20	.20	.05	.08	.09
15	0	0	1.1	1.0	.60	.40	.20	.20	.20	.05	.08	.09
16	0	0	1.1	.80	.60	.40	.20	.20	.20	.06	.10	.09
17	0	0	1.1	.80	.60	.40	.20	.20	.20	.06	.10	.09
18	0	0	1.0	.80	.60	.30	.20	.20	.20	.06	.09	.09
19	0	0	1.0	.80	.60	.30	.20	.20	.20	.06	.09	.09
20	0	0	1.0	.80	.60	.30	.30	.20	.20	.06	.09	.09
21	0	0	1.1	.80	.70	.30	.20	.20	.20	.06	.09	.09
22	0	0	1.1	.80	.70	.30	.20	.20	.20	.06	.09	.09
23	0	0	1.0	.80	.70	.30	.20	.20	.20	.06	.09	.09
24	0	0	1.0	.80	.70	.30	.20	.20	.20	.06	.09	.09
25	.20	0	1.0	.80	.80	.30	.20	.20	.20	.06	.09	.09
26	0	2.2	1.0	.80	.80	.30	.20	.20	.20	.05	.09	.09
27	0	4.9	1.0	.70	.80	.20	.20	.20	.20	.05	.09	.09
28	0	1.8	1.0	.70	.80	.20	.20	.20	.20	.05	.09	.09
29	0		1.0	.70	.80	.20	.20	.20	.20	.05	.09	.09
30	0		1.0	.70	.70	.20	.20	.20	.20	.05	.09	.09
31	0		1.0		.60		.20			.05		.09
Sum	0.20	8.9	28.50	26.60	22.40	12.60	6.30	6.30	6.00	2.20	2.52	2.79

Month	Extreme Gage Feet		Current Year 1969				Average Second Feet	Total Acre Feet	Period 1937-1969		
	High	Low	Extreme Year		Average	Maximum			Minimum		
			Day	Day			High	Low			
Jan.			25	.20	† 1	0	.007	.4	142	906	0
Feb.			27	4.9	† 1	0	.32	18	250	1,730	0
Mar.			10	2.0	† 3	.40	.92	57	359	2,360	0
Apr.			† 1	1.0	† 27	.70	.89	53	252	3,250	0
May			† 6	1.0	† 13	.60	.72	44	116	1,540	0
June			12	.70	† 27	.20	.42	25	45.4	719	0
July			20	.30	† 1	.20	.20	13	18.4	361	0
Aug.			8	.30	† 1	.20	.20	13	13.4	321	0
Sept.			† 1	.20	† 1	.20	.20	12	12.7	264	0
Oct.			1	.17	† 13	.05	.071	4.4	22.2	543	0
Nov.			10	.11	† 1	.05	.084	5.0	40.9	542	0
Dec.			† 1	.09	† 1	.09	.090	5.5	113	808	0
Yearly				4.9		0	.344	250	1,385	11,141	0

Ø Mean daily

† And other days

COTTONWOOD CREEK NEAR INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and cableway, 0.6 mile upstream from the international land boundary between the United States and Mexico, 0.5 mile downstream from the confluence of Cottonwood Creek and Tecate Creek, and 5.5 miles south of Dulzura, California. Low water discharge measurements are made by wading at the gage. Zero of gage is 542.42 feet above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow generally made twice each month. Records obtained and furnished by the U. S. Geological Survey. 1969 records good. Records available: October 1936 through 1969.

REMARKS: Flow is partially controlled by Barrett and Morena Reservoirs, 11 and 19 miles respectively, upstream from this station. The flow at this station represents the amount of water passing the Marron Dam site.

EXTREMES: Maximum discharge, 4,700 second-feet, February 7, 1937 (gage height 8.50 feet) from rating curve extended above 300 second-feet on basis of velocity, mean-depth and area computations. Minimum discharge, no flow for part of most years.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.10	11	94	7.2	1.0	.40	.10	.20	.10	.16	.14	.11
2	.10	8.2	77	7.2	1.0	.50	.10	.20	.10	.22	.14	.11
3	.10	5.9	66	7.8	.90	.30	.10	.10	.10	.25	.14	.11
4	.10	5.3	60	7.5	1.0	.30	.10	.10	.10	.19	.11	.11
5	.10	5.6	50	6.8	1.1	.30	.10	.10	.10	.19	.14	.11
6	.10	22	44	7.5	1.1	.60	.20	.10	.10	.19	.16	.11
7	.10	30	42	6.8	1.1	.60	.20	.10	.10	.19	.19	.11
8	.10	19	38	6.8	1.0	.50	.20	.10	.10	.19	.16	.11
9	.10	16	31	6.8	.90	.40	.20	.10	.10	.19	.14	.14
10	.10	13	44	7.2	.80	.40	.20	.10	.10	.19	.16	.11
11	.10	11	62	7.2	.80	.40	.20	.10	.10	.19	.16	.14
12	.10	10	43	6.5	.60	.50	.20	.10	.10	.19	.14	.16
13	.10	8.6	60	5.9	.60	.50	.20	.10	.10	.19	.11	.14
14	.20	7.2	66	5.1	.60	.40	.20	.10	.10	.16	.11	.14
15	.10	6.5	45	4.5	.60	.40	.20	.10	.10	.16	.14	.14
16	.10	6.2	38	4.1	.60	.30	.20	.10	.10	.19	.14	.14
17	.10	4.8	33	3.6	.60	.20	.20	.10	.10	.16	.14	.14
18	.10	11	31	3.6	.50	.20	.20	.10	.10	.19	.14	.16
19	.10	43	26	3.4	.50	.10	.20	.10	.10	.16	.14	.16
20	.10	33	21	3.4	.50	.10	.20	.10	.10	.16	.14	.14
21	.10	31	22	3.2	.60	.10	.20	.10	.10	.16	.16	.14
22	1.7	104	42	3.2	.60	.10	.20	.10	.10	.16	.16	.19
23	1.3	112	32	3.2	.70	.10	.20	.10	.10	.19	.16	.19
24	8.2	96	21	3.0	.60	.10	.20	.10	.10	.16	.16	.19
25	82	150	15	2.7	.60	.10	.20	.10	.10	.16	.16	.22
26	95	814	11	1.9	.60	.10	.20	.10	.10	.16	.16	.22
27	47	239	9.4	1.4	.40	.10	.20	.10	.10	.16	.14	.22
28	27	123	9.0	1.0	.40	.10	.20	.10	.10	.16	.14	.19
29	24		8.2	1.0	.40	.10	.20	.10	.10	.16	.11	.19
30	16		7.5	1.0	.40	.10	.20	.10	.10	.16	.11	.16
31	12		7.2		.40		.20	.10		.14		.19
Sum	316.40	1,946.3	1,155.3	140.5	21.50	8.40	5.70	3.30	3.00	5.48	4.30	4.69

Month	Extreme Gage Feet		Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day		Low	Average			Maximum	Minimum		
			High	Low								
Jan.			26	95	† 1	.10	10.2	628	449	2,750	0	
Feb.			26	814	17	4.8	69.5	3,860	1,217	13,680	0	
Mar.				1	94	31	7.2	37.3	2,290	2,873	27,140	0
Apr.			3	7.8	† 28	1.0	4.68	279	2,333	51,060	0	
May			† 5	1.1	† 27	.40	.69	42.6	589	14,110	0	
June			† 6	.60	† 19	.10	.28	16.7	120	2,630	0	
July			† 6	.20	† 1	.10	.18	11.3	19.4	312	0	
Aug.			† 1	.20	† 3	.10	.11	6.5	6.9	171	0	
Sept.			† 1	.10	† 1	.10	.10	6.0	9.7	152	0	
Oct.			3	.25	31	.14	.18	10.9	24.8	705	0	
Nov.			7	.19	† 4	.11	.14	8.5	61.9	839	0	
Dec.			† 25	.22	† 1	.11	.15	9.3	376	3,330	0	
Yearly				814		.10	10.29	7,169	8,080	97,900	0	

† And other days ‡ Mean daily

INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Rodríguez Dam is located in Mexico on Río de las Palmas, the principal tributary to the Tijuana River, about 5.5 miles upstream from its confluence with Cottonwood Creek, 11 miles upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 10 miles southeast of Tijuana, Baja California.

RECORDS: Computed from monthly reservoir records of storage, releases, spills, leakage, evaporation and rainfall. Records obtained by the Ministry of Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Service for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1969. Storage began in Rodríguez Reservoir on September 22, 1936.

REMARKS: Records of runoff represent all water reaching Rodríguez Reservoir including rainfall on the reservoir water surface. Area-capacity-elevation rating for reservoir used in the computations is dated 1927 when the reservoir area was initially surveyed. Elevation of crest of spillway 380.08 feet above mean sea level; at top of spillway gates 410.10 feet above mean sea level. Reservoir capacity at spillway crest 76,210 acre-feet; at top of spillway gates 111,070 acre-feet.

EXTREMES: Maximum monthly inflow, 77,320 acre-feet, April 1941; minimum, no flow during part of most years.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1938-1969		
		Average	Maximum	Minimum
January	900	912	6,569	0
February	5,758	2,529	41,295	5.8
March	1,000	6,293	68,321	4.2
April	230	3,289	77,790	0
May	94.0	413	9,962	0
June	11.0	78.2	891	0
July	0	79.9	326	0
August	25.8	53.1	770	0
September	91.6	52.3	466	0
October	10.3	63.7	344	0
November	28.5	164	1,940	0
December	27.6	981	15,686	12.8
Yearly	8,177	14,909	177,668	254

DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipe line which carries water released from Rodríguez Reservoir to the North and South Canals.

RECORDS: Direct recording by Sparling flow meter. Records obtained by the Ministry of Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano of Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Service for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1969.

REMARKS: Since the dam was completed in 1937, water has been diverted directly into the aqueduct for domestic use for Tijuana, Baja California and into the North and South Canals for irrigation in Mexico. The North Canal delivers water to lands in the Tijuana Valley north of the Río de las Palmas and the South Canal delivers water to lands in the valley south of the Río de las Palmas and the Tijuana River. During 1969, no water was released for irrigation of farm lands.

EXTREMES: Maximum monthly diversion, 1,963 acre-feet, July 1944; minimum, no flow March and April 1941, August 1960, and December 1962.

Monthly Discharge in Acre-Feet

Month	Current Year 1969	Period 1938-1969		
		Average	Maximum	Minimum
January	37.3	251	782	2.3
February	6.3	276	1,132	1.9
March	33.0	336	1,223	0
April	3.1	481	1,602	0
May	49.3	661	1,676	1.8
June	50.5	766	1,857	1.9
July	178	814	1,963	1.9
August	235	699	1,859	0
September	211	563	1,420	1.9
October	193	487	1,187	1.9
November	151	373	1,037	2.3
December	143	329	981	0
Yearly	1,289	6,037	15,317	59.6

TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on right bank about 550 feet downstream from the international boundary and about 0.8 mile west of the international gate at San Ysidro, California. Zero of gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on 15 current meter measurements and observations of no flow and a continuous record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 1969.

EXTREMES: Since May 1947: Maximum instantaneous discharge, 2,570 second-feet, March 15, 1952; minimum discharge, no flow during part or all of each year since 1951.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	120	3.4	0	0	0	0	0	0	0	0
2	0	0	99.4	2.6	0	0	0	0	0	0	0	0
3	0	0	76.1	2.2	0	0	0	0	0	0	0	0
4	0	0	60.6	1.8	0	0	0	0	0	0	0	0
5	0	0	50.6	1.7	0	0	0	0	0	0	0	0
6	0	28.4	43.8	1.6	0	0	0	0	0	0	0	0
7	0	13.5	35.5	1.2	0	0	0	0	0	0	0	0
8	0	.6	30.7	.9	0	0	0	0	0	0	0	0
9	0	.6	24.4	.8	0	0	0	0	0	0	0	0
10	0	.1	21.4	.5	0	0	0	0	0	0	0	0
11	0	0	29.3	.3	0	0	0	0	0	0	0	0
12	0	0	37.6	.3	0	0	0	0	0	0	0	0
13	0	0	55.9	.1	0	0	0	0	0	0	0	0
14	17.6	0	44.2	0	0	0	0	0	0	0	0	0
15	.6	0	51.7	0	0	0	0	0	0	0	0	0
16	0	0	36.0	0	0	0	0	0	0	0	0	0
17	0	0	30.8	0	0	0	0	0	0	0	0	0
18	0	2.2	26.1	0	0	0	0	0	0	0	0	0
19	0	32.2	23.0	0	0	0	0	0	0	0	0	0
20	.2	61.5	20.3	0	0	0	0	0	0	0	0	0
21	18.1	55.4	17.6	0	0	0	0	0	0	0	0	0
22	1.3	223	19.1	0	0	0	0	0	0	0	0	0
23	.1	175	23.0	0	0	0	0	0	0	0	0	0
24	.5	107	23.9	0	0	0	0	0	0	0	0	0
25	38.9	113	15.6	0	0	0	0	0	0	0	0	0
26	56.9	452	12.1	0	0	0	0	0	0	0	0	0
27	82.1	319	8.3	0	0	0	0	0	0	0	0	0
28	49.2	182	7.8	0	0	0	0	0	0	0	0	0
29	20.5		4.7	0	0	0	0	0	0	0	0	0
30	7.9		6.5	0	0	0	0	0	0	0	0	0
31	.6		9.0	0	0	0	0	0	0	0	0	0
Sum	294.5	1,765.5	1,065.0	17.4	0	0	0	0	0	0	0	0
Current Year 1969								Period 1947-1969				
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.	48.20		26	136	† 1	0	9.5	584	452	4,603	0	
Feb.	49.50		26	642	† 1	0	63.1	3,502	308	1,496	0	
Mar.	47.99	46.37	1	141	29	4.7	34.4	2,112	933	13,309	0	
Apr.	46.38		1	4.7	114	0	.6	34.5	272	2,926	0	
May				0	0	0	0	0	44.2	312	0	
June				0	0	0	0	0	29.0	309	0	
July				0	0	0	0	0	22.8	239	0	
Aug.				0	0	0	0	0	19.8	193	0	
Sept.				0	0	0	0	0	25.7	216	0	
Oct.				0	0	0	0	0	38.1	305	0	
Nov.				0	0	0	0	0	112	1,084	0	
Dec.				0	0	0	0	0	301	2,725	0	
Yearly				642		0	8.6	6,232	2,558	19,882	0	

† And other days

TIJUANA RIVER NEAR NESTOR, CALIFORNIA

DESCRIPTION: Water-stage recorder on county road bridge 4.1 miles downstream from the international land boundary between the United States and Mexico, 2.9 miles upstream from mouth of the river, and 1.7 miles south of Nestor, California. Zero of gage is 15.14 feet above mean sea level, U. S. C. & G. S. datum. From April 10, 1953 to August 5, 1958, station was located 2 miles upstream at different datum.

RECORDS: Based on current meter measurements or observation of no flow generally made twice a month. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1914 through September 1915, and October 1922 through 1969 (October 1922 through May 1936 are from city of San Diego, California).

REMARKS: The flow at this station is partially controlled by Morena and Barrett Reservoirs on Cottonwood Creek in the United States and by Rodríguez Reservoir on Rfo de las Palmas in Mexico. Some diversions for irrigation are normally made in Mexico whenever surface runoff occurs in the river or in its two principal tributaries.

EXTREMES: Since October 1, 1936: Maximum discharge, 17,700 second-feet, February 7, 1937 (gage height 8.20 feet), obtained from rating curve extended above 2,000 second-feet on basis of velocity-depth relationship, and cross section after peak of the flood. Minimum discharge, no flow during parts of most years.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	124	0	0	0	0	0	0	0	0	0
2	0	0	83	0	0	0	0	0	0	0	0	0
3	0	0	64	0	0	0	0	0	0	0	0	0
4	0	0	47	0	0	0	0	0	0	0	0	0
5	0	0	34	0	0	0	0	0	0	0	0	0
6	0	8.6	25	0	0	0	0	0	0	0	0	0
7	0	4.1	18	0	0	0	0	0	0	0	0	0
8	0	.10	12	0	0	0	0	0	0	0	0	0
9	0	0	8.6	0	0	0	0	0	0	0	0	0
10	0	0	3.4	0	0	0	0	0	0	0	0	0
11	0	0	1.4	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	15	0	0	0	0	0	0	0	0	0
14	2.0	0	28	0	0	0	0	0	0	0	0	0
15	.40	0	27	0	0	0	0	0	0	0	0	0
16	0	0	28	0	0	0	0	0	0	0	0	0
17	0	0	18	0	0	0	0	0	0	0	0	0
18	0	0	12	0	0	0	0	0	0	0	0	0
19	0	5.1	8.3	0	0	0	0	0	0	0	0	0
20	0	.20	6.1	0	0	0	0	0	0	0	0	0
21	6.4	.10	2.7	0	0	0	0	0	0	0	0	0
22	1.1	56	.30	0	0	0	0	0	0	0	0	0
23	0	151	2.4	0	0	0	0	0	0	0	0	0
24	0	119	7.2	0	0	0	0	0	0	0	0	0
25	8.3	86	4.7	0	0	0	0	0	0	0	0	0
26	6.2	334	.20	0	0	0	0	0	0	0	0	0
27	11	329	0	0	0	0	0	0	0	0	0	0
28	.90	182	0	0	0	0	0	0	0	0	0	0
29	.70	0	0	0	0	0	0	0	0	0	0	0
30	.20	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	37.20	1,275.20	580.30	0	0	0	0	0	0	0	0	0
Current Year 1969												
Month	Extreme Gage Feet		Extreme Second Feet		Average Second Feet	Total Acre Feet	Acre Feet					
	High	Low	High	Low			Average	Maximum	Minimum			
	Day											
Jan.			27	11	† 1	0	1.20	74	781	4,070	0	
Feb.			26	334	† 1	0	45.5	2,530	4,299	66,920	0	
Mar.			1	124	† 12	0	18.7	1,150	7,514	107,000	0	
Apr.				0		0	0	0	6,426	181,900	0	
May				0		0	0	0	717	18,340	0	
June				0		0	0	0	121	3,060	0	
July				0		0	0	0	24.1	523	0	
Aug.				0		0	0	0	17.1	242	0	
Sept.				0		0	0	0	25.1	234	0	
Oct.				0		0	0	0	85.7	1,340	0	
Nov.				0		0	0	0	146	1,490	0	
Dec.				0		0	0	0	787	7,930	0	
Yearly				334		0	5.45	3,754	20,943	332,749	0	

† And other days ‡ Mean daily

STORED WATER IN RESERVOIRS, TIJUANA RIVER BASIN

Data are presented below for all storage reservoirs in the Tijuana River Basin. The data represent contents on the last day of the month in acre-feet. The reservoir capacities indicated are total capacities, at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodríguez Dam, and at spillway level for Morena Dam, which has had an uncontrolled spillway since the spillway gates were removed in 1942. The records of storage reported below for Morena, Barrett, and Rodríguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodríguez 1927, when the reservoir area was initially surveyed.

Records for Morena and Barrett Reservoirs are obtained and furnished by the city of San Diego, the U. S. Geological Survey, and the U. S. Weather Bureau. Records for Rodríguez Reservoir are obtained and furnished by the State Department of Public Works and Services for Tijuana, Baja California.

In Acre-Feet

Month	Morena Reservoir, California (Capacity 50,210)		Barrett Reservoir, California (Capacity 44,760)		Rodríguez Reservoir, Baja California (Capacity 111,880)		Total in Tijuana River Basin Reservoirs (Capacity 206,850)	
	1969	Average 1937-1969	1969	Average 1937-1969	1969	Average 1937-1969	1969	Average 1937-1969
Jan.	1,686	16,900	2,449	11,892	878	34,084	5,013	62,876
Feb.	4,135	17,629	8,545	13,435	6,471	35,084	19,151	66,148
Mar.	4,421	18,954	15,206	15,069	7,197	38,771	26,824	72,794
Apr.	5,116	18,954	14,775	15,665	7,152	38,758	27,043	73,377
May	5,301	18,794	13,259	14,960	6,948	38,041	25,508	71,795
June	5,209	18,280	11,297	14,180	6,721	36,899	23,227	69,359
July	5,037	17,796	9,534	13,358	6,314	35,686	20,885	66,840
Aug.	4,839	17,347	7,534	12,543	5,895	34,589	18,268	64,479
Sept.	4,699	16,791	7,463	12,240	5,623	33,657	17,785	62,688
Oct.	4,580	16,548	7,403	11,864	5,302	32,875	17,285	61,287
Nov.	4,543	16,432	7,421	11,480	5,049	32,332	17,013	60,244
Dec.	4,512	16,484	7,449	11,785	4,855	32,686	16,816	60,955
Avg.	4,506	17,576	9,361	13,206	5,700	35,139	19,568	66,070
Max.	5,301	# 61,670	15,206	⊖ 45,920	7,197	109,608	27,043	213,600
Min.	1,686	10	2,449	106	878	0	5,013	1,264

March 31, 1941 - Prior to removal of spillway gates ⊖ April 30, 1937 - Sandbags were placed on crest of spillway

RAINFALL ON THE TIJUANA RIVER WATERSHED IN INCHES

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in California and Baja California. Daily records, where available, are on file in the offices of the United States and Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listing of these stations on the following page.

In United States

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Potrero, California	
	1969	Average 1906-1969	1969	Average 1907-1969	1969	Average 1951-1969	1969	Average 1914-1969
Jan.	10.56	3.87	10.45	3.41	7.17	2.73	9.12	3.46
Feb.	6.09	3.88	7.03	3.46	4.67	1.98	6.82	3.78
Mar.	1.93	3.38	2.31	2.89	2.15	2.19	2.06	2.93
Apr.	.22	1.82	.31	1.62	.38	1.48	.36	1.87
May	.41	.64	.46	.58	.31	.43	.33	.66
June	.71	.14	.04	.06	T	.04	.19	.09
July	.04	.38	.10	.10	0	.03	T	.20
Aug.	.03	.52	0	.19	0	.12	T	.18
Sept.	.02	.34	0	.26	0	.21	.02	.25
Oct.	0	.87	0	.69	0	.28	.03	.71
Nov.	2.07	1.56	1.51	1.32	.78	1.59	1.67	1.46
Dec.	.33	3.30	.35	2.92	.45	2.25	.45	3.20
Yearly	22.41	20.70	22.56	17.50	15.91	13.33	21.05	18.79

Month	Sawday Ranch, California		Campo, California		Chula Vista, California			
	1969	Average 1950-1969	1969	Average 1900-1969	1969	Average 1930-1969		
Jan.	10.27	3.22	8.30	3.06	3.27	1.84		
Feb.	7.51	2.41	5.67	3.38	3.08	1.77		
Mar.	2.14	2.66	1.96	2.74	1.08	1.47		
Apr.	.13	1.87	.10	1.51	.25	.89		
May	.56	.47	.43	.55	.21	.24		
June	0	.05	.12	.07	T	.05		
July	T	.47	.01	.55	T	.02		
Aug.	0	.77	T	.49	.01	.07		
Sept.	.07	.38	.20	.33	0	.17		
Oct.	0	.36	.02	.62	.05	.40		
Nov.	1.31	1.80	1.85	1.37	.90	1.05		
Dec.	.25	2.33	.26	2.59	.36	1.74		
Yearly	22.24	16.79	18.92	17.26	9.21	9.71		

In Mexico

Month	La Rumorosa, Baja California		Tecate, Baja California		Tijuana, Baja California		Rodríguez Dam, Baja California	
	1969	Average 1946-1969	1969	Av. 1946-59 & 1961-1969	1969	Av. 1948-59 & 1961-1969	1969	Average 1938-1969
Jan.	1.18	0.71	7.87	2.44	4.41	1.89	2.91	1.50
Feb.	T	.35	5.91	1.38	3.94	1.26	2.87	1.26
Mar.	0	.51	2.28	1.85	1.10	1.18	1.06	1.34
Apr.	0	.35	.47	1.22	T	.63	.08	.79
May	.28	.08	.28	.31	.08	.24	.24	.12
June	0	.04	.20	.08	T	.04	.04	T
July	T	.31	T	.08	0	.04	T	T
Aug.	0	.63	0	.12	0	.04	T	.04
Sept.	.43	.28	T	.12	0	.16	T	.24
Oct.	0	.31	T	.31	T	.28	T	.28
Nov.	4.33	.47	.75	1.22	.91	1.06	.75	.87
Dec.	.24	.71	.43	2.05	.28	1.30	.24	1.65
Yearly	6.46	4.76	18.19	11.81	10.71	8.66	8.19	8.03

T Trace

RAINFALL ON THE TIJUANA RIVER WATERSHED IN INCHES

In Mexico

Month	Valle de las Palmas, Baja California		El Pinal, Baja California		San Juan de Dios, Baja California			
	1969	Average 1948-1969	1969	Average 1964-1969	1969	Average 1956-1969		
Jan.	2.24	1.38	9.88	2.87	6.42	2.17		
Feb.	2.48	.98	6.77	2.40	4.41	1.93		
Mar.	1.02	1.06	2.40	1.81	1.89	1.61		
Apr.	.12	.63	.20	2.28	.20	1.30		
May	.24	.12	0	.12	.55	3.07		
June	0	T	0	0	0	.20		
July	0	.04	0	1.02	.87	1.06		
Aug.	0	.04	0	.67	*	.67		
Sept.	0	.16	.24	.59	.63	.47		
Oct.	0	.16	0	.08	0	.51		
Nov.	.59	.75	1.65	2.05	1.26	1.34		
Dec.	.12	.98	.63	4.09	.59	1.93		
Yearly	6.81	6.69	21.77	18.43	*16.81	15.67		

T Trace

* Records incomplete

LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

In United States

NAME OF STATION	LATI- TUDE	LONGI- TUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32° 41'	116° 40'	1,750	1907	City of San Diego
Campo, California	32° 37'	116° 28'	2,630	1877	Archie C. Leach
Chula Vista, California	32° 36'	117° 06'	9	1930	Western Salt Company
Marron Valley, California	32° 34'	116° 46'	550	1951	Fred Mellor
Morena Dam, California	32° 41'	116° 32'	3,010	1906	City of San Diego
Potrero, California	32° 37'	116° 37'	2,390	1914	L. W. Whitehouse
Sawday Ranch, California	32° 45'	116° 29'	3,200	1950	William Tulloch

In Mexico

NAME OF STATION	LATI- TUDE	LONGI- TUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
El Pinal, Baja California	" 32° 12'	" 116° 17'	" 4,429	1964	Hydraulic Resources
La Rumorosa, Baja California	32° 33'	116° 03'	3,937	1946	Hydraulic Resources
Rodríguez Dam, Baja California	32° 26'	116° 55'	459	1938	Hydraulic Resources
San Juan de Dios, Baja California	32° 08'	116° 10'	" 3,280	1956	Hydraulic Resources
Tecate, Baja California	32° 32'	116° 39'	1,690	1946	Hydraulic Resources
Tijuana, Baja California	32° 31'	117° 02'	180	1948	Hydraulic Resources
Valle de las Palmas, Baja California	32° 23'	116° 40'	148	1948	Hydraulic Resources

δ Elevation above mean sea level

" Estimated from topographic maps

EVAPORATION IN THE TIJUANA RIVER BASIN IN INCHES

Tabulated below are records of evaporation observed at four stations in California and at five stations in Baja California, with averages for their periods of record. The stations in California are observed by Western Salt Company, City of San Diego, California, and the United States Section of the Commission; those in Baja California are observed by the Ministry of Hydraulic Resources. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations", page 80 in this bulletin.

Types of pans used;

1. Barrett Reservoir: January 1921 through September 1926, square 3-foot by 3-foot by 18-inch deep floating pan. October 1926 through 1969, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.
2. Chula Vista: September 1918 through 1969, U. S. Weather Bureau 4-foot diameter pan, 10 inches deep, set on 2-inch by 4-inch timber grill.
3. Marron Valley: February 1951 to April 30, 1956, 2-foot diameter screened pan, 36 inches deep with automatic level attachment. From April 30, 1956 through April 29, 1963, same type of pan 22.5 inches in diameter. From April 30, 1963 to date, 2-foot diameter screened pan, same type.
4. Morena Reservoir: October 1915 through December 1921, square 3-foot by 3-foot by 18-inch deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 3-foot by 3-foot by 18-inch deep floating pan and a land pan of the same dimensions. September 1926 through 1969, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.
5. All stations in Mexico: U. S. Weather Bureau 4-foot diameter pan.

In United States

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Chula Vista, California	
	1969	Average 1916-1969	1969	Average 1921-1969	1969	Average 1951-1969	1969	Average 1919-1969
Jan.	2.45	2.28	1.41	1.87	4.13	2.83	# 3.31	2.83
Feb.	.67	2.31	1.11	2.21	2.09	3.16	3.29	3.33
Mar.	3.00	3.62	3.49	3.59	3.49	3.96	5.46	5.00
Apr.	5.02	4.90	4.42	4.88	4.22	5.38	6.54	5.89
May	6.05	6.90	5.68	6.99	5.95	6.76	6.22	6.87
June	6.38	8.79	5.79	8.53	6.57	8.07	# 6.03	6.97
July	7.99	10.26	8.08	10.22	7.81	9.64	7.50	7.62
Aug.	8.44	9.59	9.08	9.64	8.85	9.30	7.70	7.32
Sept.	5.63	7.76	6.59	7.85	7.01	8.04	5.90	6.08
Oct.	3.51	5.47	4.58	5.56	6.09	6.59	5.53	4.89
Nov.	2.47	3.60	3.22	3.49	4.57	4.45	4.09	3.63
Dec.	.92	2.56	1.65	2.15	3.21	3.15	2.94	2.76
Yearly	52.53	68.04	55.10	66.98	63.99	71.33	64.51	63.19

In Mexico

Month	Tecate, Baja California		Tijuana, Baja California		Rodríguez Dam, Baja California		Valle de las Palmas, Baja California		San Juan de Dios Baja California	
	1969	Average 1961-1969	1969	Av. 1952-59 1961-1969	1969	Av. 1939-42 1946-1969	1969	Average 1952-1969	1969	Average 1960-1969
Jan.	3.19	3.31	2.72	2.87	2.20	3.74	3.03	3.78	*	
Feb.	1.69	3.27	*	3.31	1.85	3.82	2.13	3.66	*	
Mar.	3.90	4.09	*	4.02	4.02	5.00	5.31	5.28	2.95	
Apr.	5.24	5.16	*	4.69	5.51	5.79	4.06	6.57	6.26	
May	6.18	6.34	5.55	5.83	6.50	7.32	6.69	7.52	8.43	
June	6.69	6.06	*	5.71	5.55	7.95	6.26	9.33	8.19	
July	8.74	8.62	7.17	6.73	7.87	9.02	8.35	10.91	8.03	
Aug.	7.60	8.23	7.01	7.01	7.99	8.31	10.12	10.28	*	
Sept.	7.36	6.89	5.71	6.02	6.10	7.05	7.48	8.78	7.36	
Oct.	5.98	6.54	5.35	4.72	5.47	5.98	5.04	6.46	6.38	
Nov.	5.24	3.86	5.12	3.39	5.31	5.04	4.65	4.57	4.61	
Dec.	3.70	3.62	3.11	2.99	2.60	4.21	2.32	4.09	3.39	
Yearly	65.51	67.32	*	55.51	60.98	73.62	65.43	79.88	*	

Adjusted to full month

* Record incomplete

TEMPERATURE IN THE TIJUANA RIVER BASIN IN DEGREES FAHRENHEIT

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few feet above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations", page 80 in this bulletin.

In United States

Month	Barrett Dam, California				Campo, California				Chula Vista, California			
	1969			Average 1931-1969	1969			Average 1951-1969	1969			Average 1931-1969
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	51.5	83	26	48.6	50.5	85	23	46.8	56.1	76	34	52.5
Feb.	47.6	71	28	50.3	45.6	69	22	47.8	52.9	75	40	53.7
Mar.	51.1	86	30	53.2	48.3	83	24	49.2	53.7	77	38	55.2
Apr.	57.8	84	36	57.9	53.0	83	26		58.6	78	43	58.0
May	63.1	90	40	62.8	59.1	95	26	58.1	60.5	70	49	60.6
June	65.6	97	50	67.9	61.3	99	37	64.3	63.2	71	55	62.9
July	75.9	101	48	76.0	73.0	103	37	73.2	66.6	74	57	
Aug.	80.2	108	51	76.2	76.7	104	44	73.5	69.3	84	61	
Sept.	75.3	104	50	72.4	72.2	100	40	69.2	67.0	77	60	
Oct.	60.3	95	37	64.2	56.4	89	29	61.1	60.9	78	46	62.8
Nov.	57.6	87	32	56.0	54.0	81	25	52.8	60.3	82	40	
Dec.	50.4	78	23	50.6	47.6	80	14		54.4	79	33	54.3
Yearly	61.4	108	23	61.3	58.1	104	14		60.3	84	33	

In Mexico

Month	La Rumorosa, Baja California				Tecate, Baja California				Tijuana, Baja California			
	1969		1946-1969		1969		1946-59 & 1961-69		1969		1948-59 & 1961-69	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	79	52	81	5	82	21	100	21	77	34	91	27
Feb.	59	19	82	10	66	27	100	21	73	41	102	32
Mar.	79	27	88	16	82	25	93	25	86	39	90	34
Apr.	77	32	91	23	82	36	99	32	86	45	97	34
May	88	34	97	28	84	39	100	36	82	50	97	43
June	97	43	113	34	93	46	104	36	84	50	99	41
July	97	39	104	39	102	46	115	36	88	61	120	46
Aug.	100	61	102	46	106	54	113	34	93	63	106	52
Sept.	97	45	104	34	102	46	115	36	86	57	120	46
Oct.	82	32	93	25	90	32	106	32	86	48	117	43
Nov.	70	36	88	14	88	32	97	27	86	45	108	34
Dec.	70	21	81	10	79	36	90	23	77	36	99	25
Yearly	100	19	113	5	106	21	115	21	93	34	120	25

Month	Rodríguez Dam, Baja California				Valle de las Palmas, Baja California				El Pinal, Baja California			
	1969		1938-1969		1969		1948-1969		1969		1964-1969	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	84	36	88	27	70	19	88	12	73	23	73	12
Feb.	73	39	91	32	70	30	99	23	64	25	75	21
Mar.	84	39	88	32	86	30	100	28	64	27	77	23
Apr.	88	41	93	36	88	37	104	32	72	28	82	18
May	86	48	99	37	93	45	108	36	90	41	90	27
June	90	55	108	46	91	50	118	39	99	43	99	30
July	95	57	104	48	104	45	120	45	100	48	100	39
Aug.	104	61	104	52	111	54	111	48	104	50	104	39
Sept.	93	57	108	48	106	52	117	43	97	43	102	39
Oct.	90	46	108	43	97	39	108	37	86	41	95	34
Nov.	90	43	99	30	90	34	100	19	73	37	84	28
Dec.	79	32	93	27	81	25	91	21	66	25	79	25
Yearly	104	32	108	27	111	19	120	12	104	23	104	12

**TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES FAHRENHEIT**

In Mexico

Month	San Juan de Dios, Baja California											
	1969		1956-1969									
	Max.	Min.	Max.	Min.								
Jan.	88	19	88	7								
Feb.	61	21	84	16								
Mar.	77	19	84	18								
Apr.	77	27	102	19								
May	88	25	91	21								
June	95	34	106	28								
July	97	37	120	36								
Aug.	*	*	106	32								
Sept.	95	39	100	25								
Oct.	84	36	100	19								
Nov.	75	34	99	12								
Dec.	75	18	88	14								
Yearly	*	*	120	7								

* Record incomplete

**DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS
ALONG TIJUANA RIVER AND TRIBUTARIES
1969**

The total area within Tijuana River basin is 1,731 square miles, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by the United States Department of Agriculture and the State Engineer, State of California, or estimated from aerial photographs. Those in Mexico were furnished by the Ministry of Hydraulic Resources of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana Basin in 1969 was by pumping from ground water.

Designation of Areas	Drainage Basin-Square Miles			Irrigated Areas-Acres		
	United States	Mexico	Total	United States	Mexico	Total
Cottonwood Creek above Morena Dam	114	0	114	(a) 75	0	(a) 75
Morena Dam to Barrett Dam	133	0	133	0	0	0
above Barrett Dam	247	0	247	(a) 75	0	(a) 75
below Barrett Dam and above Tecate Creek	65	0	65	(a) 145	0	(a) 145
above Tecate Creek	312	0	312	(a) 220	0	(a) 220
Campo Creek above International Boundary	82	4	86	(a) 320	0	(a) 320
Tecate Creek above International Boundary (does not include Campo Creek)	19	64	83	0	0	0
Cottonwood Creek above International Boundary Station	413	68	481	(a) 540	0	(a) 540
Río de las Palmas above Rodríguez Dam	7	981	988	0	(b) 0	0
Tijuana River above Nestor Gaging Station	458	1,266	1,724	3,000	(c) 346	3,346
above the Mouth	462	1,269	1,731			

(a) Estimated as of 1948. During extremely dry years these areas may be materially reduced.

(b) Areas in upper valleys may be irrigated by pumping from ground water.

(c) There was no irrigation in 1969 in the Tijuana Irrigation District, Tijuana Valley, Baja California, Mexico, from the Rodríguez Reservoir, but an estimated area of about 346 acres was irrigated by pumping from ground water. Depending upon the availability of water this acreage varies considerably from year to year.



WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 450 feet upstream from the Southern Pacific Railroad bridge, 1.5 miles upstream from the international boundary, and 2 miles west of Douglas, Arizona. Zero of gage is 3,906.94 feet above mean sea level, U. S. C. & G. S. datum of 1929.

RECORDS: Based on 11 current meter measurements or observations of no flow during the year. Computations by shifting control methods. Records obtained and furnished by the U. S. Geological Survey. Records fair except for periods of fragmentary or no gage height record, which are poor. Records available: August to October 1911 (gage heights and discharge measurements only), July to October 1912, January to June 1913, October 1913, December 1913 to June 1914, February to June 1915, October 1915 to September 1919, October 1919 to April 1922 (gage heights and discharge measurements only), June 1930 to December 1933, May 1935 to July 1947, October 1947 through 1969 (July 1954 to March 1955 monthly discharge only).

REMARKS: Diversions above this station are mainly by pumping from ground water for irrigation. Records show flow at the international boundary into Mexico except for some smelter waste water entering the stream a short distance below this station.

EXTREMES: Prior to 1936: Maximum recorded discharge, 3,450 second-feet August 10, 1931 (gage height 12.15 feet); maximum estimated discharge, 4,050 second-feet July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 5,060 second-feet August 7, 1955; maximum gage height 14.93 feet July 27, 1959; minimum daily discharge, no flow at times during most years.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.01	0	.08	0	0	0	0	5.0	22	2.2	0	.04
2	.02	0	.08	0	0	0	0	2.0	13	.57	.15	.05
3	.02	0	.08	0	0	0	0	1.0	6.0	.26	.11	.18
4	.01	0	.09	0	0	0	0	1.0	1.0	0	.08	.51
5	.01	0	.10	0	0	0	0	1.0	.50	0	.08	.65
6	.01	.01	.10	0	0	0	0	191	44	0	.10	.14
7	.01	.01	.10	0	0	0	0	133	3.0	0	.18	.05
8	.01	.01	.10	0	0	0	0	4.0	1.0	0	.04	.03
9	.01	.01	.09	0	0	0	0	3.0	.50	0	.19	.02
10	.01	.01	.09	0	0	0	0	3.0	.30	0	.03	.02
11	.01	.01	.10	0	0	0	0	2.0	.30	0	.34	.02
12	.01	.01	.10	0	0	0	0	2.0	.20	0	.23	.02
13	.01	.02	.09	0	0	0	0	1.1	2.5	0	.27	.02
14	.01	.05	.09	0	0	0	0	111	36	0	.42	.02
15	.03	.02	.10	0	0	0	60	6.7	3.0	0	.44	.02
16	.01	.02	.10	0	0	0	7.5	3.4	1.0	0	.30	.01
17	.01	.03	.08	0	0	0	85	2.1	.50	0	.06	0
18	.01	.03	.03	0	0	0	1.7	4.9	.30	0	.01	.03
19	.01	.03	.03	0	0	0	.17	2.2	.20	0	0	.24
20	.01	.03	.05	0	0	0	.13	1.4	.10	.61	0	.15
21	0	.03	.01	0	0	0	.08	.26	0	.37	0	.35
22	0	.04	0	0	0	0	.05	.08	0	.53	0	.20
23	0	.05	0	0	0	0	.04	.02	0	1.3	0	.01
24	0	.05	0	0	0	0	52	.13	0	.88	0	0
25	0	.06	0	0	0	0	46	135	0	.89	.02	0
26	0	.05	0	0	0	0	4.7	7.0	0	.92	.03	0
27	0	.06	0	0	0	0	154	25	0	1.1	.04	0
28	0	.07	0	0	0	0	416	5.4	0	.89	.02	.01
29	0	0	0	0	0	0	156	30	0	.93	.02	.01
30	0	0	0	0	0	0	92	20	0	.18	.03	0
31	0	0	0	0	0	0	14	16	0	.01	.03	0
Sum	0.24	0.71	1.69	0	0	0	1,089.37	719.69	135.40	11.64	3.19	2.80

Month	Current Year 1969						Period 1936-1969				
	Extreme Gage Feet		Extreme Second Feet		Average Second Feet	Total Acre Feet	Acre Feet				
	High	Low	Day	Low			Average	Maximum	Minimum		
Jan.			15	0.03	†21	0	0.008	0.5	47.2	451	1.0
Feb.			28	.07	†1	0	.025	1.4	25.2	132	0
Mar.			†5	.10	†22	0	.055	3.4	27.4	130	0
Apr.			0	0	0	0	0	0	25.1	173	0
May			0	0	0	0	0	0	18.3	138	0
June			0	0	0	0	0	0	159	1,590	0
July			28	.416	†1	0	35.1	2,161	# 2,231	8,110	39
Aug.			6	.191	23	.02	23.2	1,427	# 3,392	14,480	.3
Sept.			6	.44	†21	0	4.51	269	# 786	3,170	.8
Oct.			1	2.2	†4	0	.38	23.1	161	2,210	.4
Nov.			15	.14	†1	0	.11	6.3	46.1	352	.2
Dec.			5	.65	†17	0	.09	5.6	151	2,363	.4
Yearly				.416		0	5.38	3,897		22,321	900

∅ Mean daily † And other days # 1947 records not available

SEWAGE EFFLUENT, DOUGLAS, ARIZONA AND AGUA PRIETA, SONORA INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Flume in influent line at treatment plant, equipped with stilling well and staff gage, for measuring combined flows of Douglas, Arizona and Agua Prieta, Sonora, and Parshall flume with recording flow meter for measuring flows from the city of Douglas. Beginning April 8, 1968, all sewage flows from Agua Prieta, Sonora were diverted to sewage lagoons located in Mexico.

RECORDS: Combined discharges are computed from daily 11:00 a. m. readings of the staff gages by applying an 11:00 a. m. index determined from 7 days of hourly measurements during which the relationship between mean daily readings and 11:00 a. m. readings was developed. Records available: Continuous monthly records since March 1948; daily records March 18, 1948 through December 1950 and January 1952 through 1969.

REMARKS: Douglas-Agua Prieta International Treatment Plant was constructed by the Governments of the United States and Mexico in 1947 to correct a serious international sanitation problem and is located in the United States adjacent to the international boundary about one mile west of the Douglas-Agua Prieta Port of Entry. The effluent from the plant is treated in oxidation ponds in Mexico.

Month	Total Monthly Flows			Mean Daily Flows-Millions of Gallons Per Day					
	Millions of Gallons			Current Year 1969			Period 1952-1969		
	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	28,574	0	28,574	1.006	.802	.922	1.618	0.619	1.062
Feb.	26,724	0	26,724	1.010	.846	.954	1.784	.584	1.065
Mar.	30,262	0	30,262	1.030	.910	.976	1.598	.590	1.066
Apr.	29,524	0	29,524	1.080	.868	.984	1.536	.619	1.064
May	30,554	0	30,554	1.080	.806	.986	1.595	.619	1.069
June	31,102	0	31,102	1.112	.945	1.037	1.784	.626	1.131
July	32,312	0	32,312	1.123	.966	1.042	3.209	.619	1.187
Aug.	33,078	0	33,078	1.250	.968	1.067	1.985	.619	1.203
Sept.	31,318	0	31,318	1.130	.948	1.044	1.884	.626	1.186
Oct.	30,824	0	30,824	1.086	.946	.994	1.667	.626	1.123
Nov.	28,784	0	28,784	1.050	.896	.959	1.586	.619	1.083
Dec.	30,340	0	30,340	1.290	.870	.979	1.736	.619	1.088
Yearly	363,396	0	363,396	1.290	.802	.995	3.209	0.584	1.111

SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on the downstream side of pier on bridge on Highway 92, 0.7 mile east of Palominas, 2.5 miles upstream from Green Brush Draw, 4.5 miles downstream from international boundary, and 12 miles southwest of Bisbee, Arizona. Zero of gage is 4,187.62 feet above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements or observations of no flow during the year. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 1969. Records obtained and furnished by U. S. Geological Survey.

REMARKS: There are some small diversions for irrigation of a few hundred acres above this station, mostly in Mexico. Record shows approximate flow of river at international boundary.

EXTREMES: Maximum daily discharge, 22,000 second-feet on August 14, 1940 (gage height, 16.16 feet present datum) from rating curve extended above 5,600 second-feet on basis of slope-area measurement of peak flow; no flow at times in most summers. Greatest flood known occurred on September 28, 1926 (gage height, about 23.9 feet present datum, from floodmarks; discharge not determined).

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.70	2.5	3.0	0	0	.10	0	6.1	30	0	.10	.20
2	.80	2.5	3.0	0	0	.10	0	6.1	298	0	.10	.20
3	.80	2.8	3.0	0	0	.10	0	5.8	61	0	.10	.20
4	1.0	2.8	3.0	0	0	.10	0	5.8	17	0	.10	.10
5	1.0	2.8	3.0	0	0	.10	0	163	7.0	0	.10	.10
6	1.1	3.0	3.0	0	0	0	0	211	4.0	0	.20	.20
7	1.1	3.0	3.0	0	0	0	0	253	2.5	0	.20	.10
8	1.1	3.0	3.0	0	0	0	0	473	1.5	0	.20	0
9	1.0	3.0	2.8	0	0	0	0	100	1.0	0	.30	0
10	1.0	3.0	2.5	0	0	0	0	40	1.0	0	.30	0
11	1.1	3.0	2.1	0	0	0	0	30	5.0	0	.30	0
12	1.1	3.0	1.9	0	0	0	0	25	6.0	0	.30	0
13	1.2	3.0	1.7	0	0	0	0	20	3.0	0	.30	0
14	1.2	3.0	1.6	0	0	0	0	18	79	0	.20	0
15	1.4	3.0	1.4	0	0	0	95	7.7	17	0	.10	0
16	1.4	3.0	1.2	0	0	0	82	4.4	29	0	0	0
17	1.6	3.0	1.1	0	0	0	0	3.5	10	0	.30	0
18	1.6	3.0	1.0	0	0	0	0	23	3.0	0	.50	0
19	1.7	3.0	.80	0	0	0	0	4.4	2.1	0	.20	.10
20	1.7	3.0	.70	0	0	0	0	16	1.4	0	.10	.10
21	1.7	3.0	.60	0	0	0	0	3.0	1.0	0	0	0
22	1.9	3.0	.50	0	0	0	8.9	.40	.50	0	0	0
23	2.1	3.0	.50	0	0	0	25	.40	.40	0	0	0
24	2.3	3.0	.40	0	0	0	25	51	.30	0	0	.30
25	2.3	3.0	.30	0	0	0	560	59	.20	0	0	.50
26	2.3	3.0	.30	0	0	0	135	31	.10	0	0	.40
27	2.3	3.0	.20	0	.10	0	32	299	0	0	0	.40
28	2.5	3.0	.10	0	.10	0	903	59	0	0	0	.50
29	2.5		.10	0	.10	0	69	279	0	0	.10	1.1
30	2.5		0	0	.10	0	17	183	0	0	.20	2.1
31	2.5		0	0	.10	0	7.7	40		.10		2.1
Sum	48.50	82.4	45.80	0	0.50	0.50	1,959.6	2,420.60	581.00	.10	4.30	8.70

Month	Extreme Gage Feet		Current Year 1969				Average Second Feet	Total Acre Feet	Period 1951-1969		
	High	Low	Extreme Second Feet		Total	Average			Maximum	Minimum	
			Day	High			Day	Low			
Jan.			†28	2.5	† 1	0.7	1.56	96.2	737	7,813	2.6
Feb.			† 6	3.0	† 1	2.5	2.94	163	395	1,577	3.0
Mar.			† 1	3.0	†30	0	1.48	90.8	318	2,043	36.0
Apr.				0		0	0	0	91.2	330	0
May			†27	.10	† 1	0	.02	1.0	19.8	68.8	0
June			† 1	.10	† 6	0	.02	1.0	193	1,391	0
July			28	903	† 1	0	63.2	3,887	6,567	17,238	184
Aug.			8	473	†22	.4	78.1	4,801	10,462	36,369	165
Sept.			2	298	†27	0	19.4	1,152	1,765	16,344	28.4
Oct.			31	.10	† 1	0	.003	.2	153	1,201	0
Nov.			†18	.50	†21	0	.14	8.5	132	609	0
Dec.			†30	2.1	† 8	0	.28	17.3	955	10,959	6.2
Yearly				903		0	13.9	10,218	21,788	55,364	4,400

∅ Mean daily † And other days

SANTA CRUZ RIVER NEAR LOCHIEL, ARIZONA

DESCRIPTION: Water-stage recorder located in the United States near left bank on the downstream side of concrete bridge pier of county highway bridge, 2.5 miles northeast of Lochiel, Arizona, and 1.5 miles upstream from the international land boundary. The elevation of the zero of the gage has not been determined but topographic maps indicate the elevation of the stream bed at the gage is about 4,620 feet.

RECORDS: Based on 14 current meter measurements or observations of no flow during the year. Computations by shifting control methods. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 1969.

REMARKS: There are small diversions by ground water pumping for irrigating about 200 acres above this station.

EXTREMES: Maximum discharge, 4,810 second-feet on September 12, 1965 (gage height 8.90 feet); minimum discharge, no flow for several days of each year.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.57	.53	.78	.08	.29	.06	0	4.4	2.1	1.2	1.3	1.1
2	.60	.54	.79	.11	.24	.19	0	6.9	2.0	1.2	1.4	1.0
3	.65	.56	.80	.11	.15	.21	.04	10	2.3	1.2	1.3	1.2
4	.66	.59	.84	.11	.31	.37	.29	5.0	2.0	1.0	1.3	1.1
5	.68	.59	.75	.10	.62	.40	.06	48	1.8	.97	1.3	1.0
6	.65	.56	.77	.06	.63	.50	0	7.2	2.3	1.0	1.2	1.0
7	.63	.58	.82	.07	.58	.47	0	3.2	1.7	1.0	1.2	1.0
8	.65	.56	.80	.05	.55	.36	.54	2.8	1.4	1.0	1.2	1.0
9	.64	.58	.81	.03	.49	.36	.91	1.0	1.3	1.0	1.2	1.0
10	.63	.68	.86	.02	.53	.43	.90	.80	1.2	1.1	1.1	1.0
11	.61	.71	.84	.04	.59	.10	1.1	.80	1.1	1.1	1.2	.97
12	.61	.74	.80	.07	.57	0	1.0	3.0	1.2	1.2	1.1	.96
13	.66	.82	.82	.07	.61	0	1.0	1.2	1.2	1.2	1.1	.96
14	.82	.76	.90	.06	.62	0	.99	1.0	1.8	1.3	1.2	.96
15	.73	.73	.87	.13	.59	0	1.8	.70	2.8	1.3	1.2	.96
16	.64	.73	.82	.17	.59	0	2.9	.70	1.8	1.3	1.7	.88
17	.62	.73	.85	.15	.60	0	3.9	.80	1.4	1.3	1.3	.88
18	.62	.74	.67	.19	.53	0	18	1.1	1.2	1.3	1.2	.85
19	.62	.75	.57	.19	.55	0	11	1.8	1.2	1.3	1.2	.86
20	.61	.79	.55	.11	.51	0	3.6	2.2	1.2	1.2	1.2	.85
21	.60	.79	.51	.09	.46	0	1.6	2.4	1.2	1.2	1.2	.87
22	.59	.81	.50	.06	.13	0	1.6	2.7	1.2	1.1	1.2	.83
23	.64	.80	.34	.07	.04	.01	5.4	38	1.2	1.2	1.2	.80
24	.62	.80	.30	.06	.02	.01	13	6.7	1.2	1.2	1.2	.79
25	.62	.79	.21	.05	.02	0	5.7	2.7	1.2	1.2	1.2	.80
26	.62	.77	.15	.04	.07	.01	38	6.6	1.2	1.3	1.2	.78
27	.59	.77	.14	.03	.09	.02	5.2	3.9	1.1	1.3	1.2	.66
28	.50	.80	.12	.14	.06	0	5.1	2.6	1.2	1.2	1.2	.75
29	.47	.11	.28	.07	0	0	5.1	2.6	1.2	1.2	1.2	.74
30	.45	.11	.37	.06	0	0	4.4	2.2	1.2	1.3	1.1	.73
31	.46	.10	.10	.05	.05	0	4.4	2.1	1.2	1.3	1.1	.72
Sum	19.06	19.60	18.30	3.11	11.22	3.50	137.53	175.10	44.9	36.77	36.8	28.00
Month	Current Year 1969						Period 1949-1969					
	Extreme Gage Feet		β Extreme Second Feet				Average Second Feet	Total Acre Feet	Acre Feet			
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum	
Jan.			14	0.82	30	0.45	0.61	37.8	48.1	226	1.3	
Feb.			13	.82	1	.53	.70	38.9	42.2	261	1.8	
Mar.			14	.90	31	.10	.59	36.3	36.7	250	.7	
Apr.			30	.37	10	.02	1.0	6.2	21.0	148	0	
May			6	.63	† 24	.02	.36	22.3	8.8	49.5	0	
June			6	.50	† 12	0	1.2	6.9	3.0	22.3	0	
July			26	.38	† 1	0	4.44	273	544	4,270	1.6	
Aug.			5	.48	† 15	.70	5.65	347	1,164	10,120	.08	
Sept.			15	2.8	† 11	1.1	1.50	89.1	357	2,634	0	
Oct.			† 14	1.3	5	.97	1.19	72.9	89.2	448	0	
Nov.			16	1.7	† 10	1.1	1.23	73.0	41.9	182	0	
Dec.			3	1.2	27	.66	.90	55.5	74.1	693	0	
Yearly				48		0	1.46	1,059	2,430	12,633	126	

β Mean daily

† And other days

SANTA CRUZ RIVER AT EL CAJON, SONORA

DESCRIPTION: Water-stage recorder, cableway, and Cipolletti weir with crest length of 26.25 feet and depth of 0.82 foot, 4.3 miles southwest of Santa Cruz, Sonora and approximately 30 miles southeast of Nogales, Sonora. Zero of gage is 4,270.24 feet above mean sea level, U. S. C. & G. S. datum, which is the same elevation as the crest of the weir.

RECORDS: Data is based on river stages and on current meter measurements made during the year. Data obtained and furnished by the Mexican Section of the Commission. Records available: January 14, 1954 through August 1959; October 1, 1959 to June 14, 1960; July 1960; January 6, 1961 to September 5, 1963; October 15, 1963 to August 3, 1964; January 9 to February 11 and April 1 through December 1965; January 1, 1966 through November 1967; February 8 to October 23 and December 13 through 31, 1968; January 1 to April 9, June 5 to July 30, August 15 through 24, and October 17 through December 31, 1969.

REMARKS: Irrigation diversions above the station affect the regimen of the river. A flood in August 1955 destroyed the weir which was repaired in February 1957.

EXTREMES: Maximum instantaneous discharge, 4,590 second-feet on August 6, 1955 with stage of 6.00 feet. Minimum discharge, zero on August 12 and September 22, 1968.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.7	4.2	3.9	1.4	θ	θ	3.5	θ	θ	θ	5.7	7.1
2	5.3	4.6	2.5	1.8			3.2				6.0	7.1
3	5.3	4.6	2.5	1.8			3.9				6.7	6.4
4	4.9	4.9	2.5	2.5			3.5				6.7	7.8
5	4.2	4.9	2.8	2.8		1.8	2.5				6.7	6.7
6	3.9	5.7	2.8	2.8		1.4	2.1				6.7	7.4
7	2.8	6.0	3.5	2.1		1.4	2.8				6.7	9.9
8	2.5	6.4	3.5	2.1		1.8	6.7				6.7	10.9
9	2.5	7.4	3.5	2.8		1.4	2.1				6.7	8.1
10	1.8	7.4	3.5	θ		1.4	2.5				6.7	6.4
11	2.1	6.0	3.9			1.4	2.8				7.1	7.1
12	2.8	4.6	3.5			1.4	7.1				7.1	6.0
13	2.5	6.7	3.5			1.4	7.1				7.4	6.7
14	1.8	7.8	3.5			2.1	13.4				5.7	7.4
15	2.1	7.4	4.6			1.8	3.2	12.4			4.2	6.7
16	2.1	6.7	4.9			1.8	2.8	17.3			4.9	9.9
17	2.1	6.4	4.9			2.1	4.2	9.9		7.1	5.3	8.8
18	2.8	6.4	4.2			1.8	4.9	9.2		7.1	5.7	12.4
19	3.2	6.4	4.2			1.8	4.2	37.1		7.1	5.7	13.4
20	3.2	6.4	4.2			2.1	7.4	11.7		6.4	5.7	13.8
21	3.2	6.4	4.2			2.5	7.1	12.0		6.7	6.0	13.4
22	3.9	6.4	4.6			2.5	4.2	43.1		7.4	6.0	13.4
23	4.2	5.7	5.3			2.5	6.4	8.8		6.7	6.0	13.8
24	3.5	5.3	6.0			2.8	5.3	6.4		5.7	6.4	13.8
25	3.2	5.3	5.3			3.5	8.8	θ		5.3	6.7	13.8
26	3.2	4.9	4.2			3.2	4.2			5.3	7.1	13.8
27	3.2	4.9	4.2			2.8	4.6			2.5	6.7	14.1
28	3.5	4.6	3.2			2.1	9.5			2.5	6.7	12.7
29	3.5		2.8			3.5	5.7			4.9	7.1	12.4
30	3.5		2.8			3.9	3.2			5.3	7.1	12.7
31	3.5		1.8				θ			5.7		12.4
Sum	102.0	164.4	116.8	20.1		56.2	148.9	167.9		85.7	189.9	316.3

Current Year 1969									# Period 1954-1969		
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.	.13	.03	1	6.0	† 10	1.8	3.2	203	521	1,486	203
Feb.	.07	.10	14	7.8	† 12	4.2	6.0	326	442	1,598	98.1
Mar.	.13	.03	24	6.4	31	1.8	3.9	233	392	885	176
Apr.									236	528	74.9
May									197	512	101
June									154	486	63.1
July									683	1,227	83.5
Aug.									4,209	32,608	229
Sept.									929	3,000	106
Oct.									404	1,165	78.5
Nov.	.16	.07	13	7.8		3.2	6.4	376	391	838	134
Dec.	.30	.13	24	14.1	† 3	5.7	10.2	627	462	831	186
Yearly									11,565	38,895	2,317

Some months and years missing

θ Recorder inoperative

† And other days

SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 5.5 miles east of Nogales, Arizona, 0.75 mile downstream from the international boundary and 6 miles upstream from the Santa Cruz River bridge on State Highway No. 82. Zero of gage is 3,702.54 feet above mean sea level, U.S.C. & G.S. datum (levels by International Boundary and Water Commission).

RECORDS: Based on 16 record meter measurements or observation of no flow during the year. Computations by shifting control methods. Records obtained and furnished by the U. S. Geological Survey. Records available: March to November 1907 and April 1909 to December 1912 (discharge measurements and fragmentary gage height record), January 1913 to June 1922 (October 1915 to September 1916, monthly discharges only), May 1930 to December 1933, July 1935 through 1969.

REMARKS: Diversions in both countries affect the flow at this station. The major diversions occur in Mexico for domestic and irrigation uses. There are no storage dams above the station as of December 1969.

EXTREMES: Prior to 1936: Maximum discharge, 12,000 second-foot, August 31, 1935 (gage height 12.3 feet); minimum discharge, no flow for several days each year. Since 1936: Maximum discharge, 10,600 second-feet, July 10, 1954 (gage height 13.27 feet); minimum discharge, no flow for several days of many years.

Mean Daily Discharge in Second Feet 1969 — Annual and Period Summary

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.7	4.5	4.9	1.8	.5	.2	0	22	64	5.3	3.4	10
2	9.4	4.9	4.9	1.5	.5	.2	0	352	285	5.3	4.2	9.4
3	10	4.9	4.9	1.8	.4	.2	0	327	128	5.3	5.3	12
4	9.4	4.5	4.5	1.8	.6	.2	0	128	128	4.9	5.3	12
5	9.4	5.3	4.9	1.6	1.3	.2	0	88	80	4.9	5.3	11
6	9.4	4.9	4.9	1.3	1.1	.2	0	69	61	4.5	5.7	10
7	7.7	5.3	5.3	1.8	.9	.2	0	73	74	4.5	6.1	8.9
8	7.1	5.3	5.3	3.4	.7	.2	0	177	56	4.2	6.6	10
9	6.6	4.9	4.9	3.0	.5	.2	0	73	40	3.8	6.1	7.1
10	5.7	4.9	4.5	2.6	.4	.2	0	50	32	3.8	6.1	7.1
11	5.3	5.3	4.2	2.6	.4	.2	0	35	33	3.0	7.1	7.7
12	5.3	5.3	3.0	2.6	.4	.2	0	173	28	3.8	7.1	9.4
13	4.9	6.6	3.4	3.0	.4	.2	0	188	105	3.4	6.6	9.4
14	6.6	7.1	3.8	2.6	.3	.2	.1	77	86	3.0	6.6	7.7
15	8.3	6.1	4.2	2.6	.3	.2	.2	43	87	2.6	6.6	8.3
16	7.1	3.8	3.4	2.2	.3	.2	52	26	53	2.6	8.3	8.3
17	7.1	3.4	3.4	2.2	.2	.2	13	32	39	2.6	7.1	8.3
18	7.1	3.4	4.2	2.2	.2	.2	31	15	35	2.2	7.1	7.7
19	6.1	4.2	4.2	1.8	.2	.2	16	13	24	2.6	6.6	6.1
20	5.7	3.8	3.8	1.6	.2	.1	10	12	22	2.6	6.1	6.6
21	5.7	3.4	3.4	1.3	.2	.1	51	10	18	3.4	6.6	6.1
22	5.3	3.4	4.2	1.3	.2	.1	14	6.0	14	3.4	6.6	6.1
23	5.3	3.8	5.3	1.3	.2	.1	.1	6.2	12	3.4	6.1	6.1
24	4.9	3.8	4.5	1.1	.2	0	5.7	87	7.8	3.0	6.6	6.1
25	4.5	3.8	3.4	1.1	.3	0	51	32	5.4	2.6	6.6	6.6
26	4.2	4.2	3.0	.9	.2	0	48	454	5.4	2.6	6.6	7.1
27	4.5	4.5	3.0	.9	.2	0	20	278	5.4	3.0	6.6	7.7
28	4.9	4.9	3.0	.7	.2	0	164	180	5.1	3.0	6.6	8.9
29	4.9	3.4	3.4	.6	.2	0	120	258	5.1	3.0	8.3	10
30	4.9	1.8	1.8	.6	.2	0	58	128	5.1	3.0	9.4	10
31	4.9		1.8		.2		195	77		3.8		11
Sum	199.9	130.2	123.4	53.8	12.1	4.2	850.0	3,489.2	1,543.3	109.1	193.3	262.7

Month	Extreme Gage Feet		Ø Extreme Second Feet				Average Second Feet	Total Acre Feet	Period 1936-1969 Acre Feet		
	High	Low	Day	High	Day	Low	Acre Feet	Average	Maximum	Minimum	
Jan.			3	10	26	4.2	6.4	397	1,258	16,710	62
Feb.			14	7.1	† 17	3.4	4.6	258	904	11,129	59
Mar.			† 7	5.3	† 30	1.8	4.0	245	648	2,692	95
Apr.			8	3.4	† 29	.6	1.8	107	221	1,186	19
May			5	1.3	† 17	.2	.4	24.0	70.3	338	2
June			† 1	.2	† 24	0	.1	8.3	72.4	1,020	0
July			31	195	† 1	0	27.4	1,686	2,547	15,610	45
Aug.			26	454	22	6.0	113	6,921	6,344	45,790	91
Sept.			2	285	† 28	5.1	51.4	3,061	1,361	7,507	17
Oct.			† 1	5.3	18	2.2	3.5	216	332	1,550	1.2
Nov.			30	9.4	1	3.4	6.4	383	270	1,140	1.2
Dec.			† 3	12	† 19	6.1	8.5	521	1,963	28,559	27
Yearly				454		0	19.1	13,827	15,991	57,671	3,499

Ø Mean daily † And other days

SEWAGE EFFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Two 12-inch Parshall flumes, each with a recording flow meter and continuous totalizer, one located at the international boundary for measuring effluent coming from Nogales, Sonora, and the second located at the treatment plant in the influent line of secondary settling tank; and two calibrated sludge pumps of which pumping times are recorded. One pumps from primary settling tank into digester and the other recirculates sludge from secondary tank to primary tank. Bypass of raw sewage may be made to Nogales Wash, the quantity being estimated on basis of head in a control box in influent line ahead of primary tank. Nogales international sewage treatment plant is located near the north edge of Nogales, Arizona on right bank of Nogales Wash, approximately 2 miles downstream from the international boundary.

RECORDS: Total effluent is computed by adding to the flow measured in the flume from primary to secondary tank, the sludge pumped from primary tank into digester, which does not pass through this flume; subtracting the sludge recirculated from secondary to primary tank, which passes through this flume twice; and adding those flows of bypassed raw sewage into Nogales Wash. Flows from the United States are deduced from total measured flows less measured flows from Mexico. Records available: Continuous monthly record since the plant was placed in operation in August 1951, daily record January 1952 through 1969.

REMARKS: Nogales International Treatment Plant treats combined sewage from Nogales, Arizona and Nogales, Sonora by means of primary and secondary sedimentation, sludge digestion, and trickling filters. Chlorination of plant effluent, which may be used for irrigation of lands lying north of the plant, is carried out by the United States at its expense.

Month	Total Monthly Flows Millions of Gallons			Mean Daily Flows-Millions of Gallons Per Day					
				Current Year 1969			Period 1952-1969		
	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	31.446	58.243	89.689	3.074	2.690	2.893	* 4.800	0.650	2.145
Feb.	26.449	56.392	82.891	3.200	2.735	2.960	* 6.130	.650	2.234
Mar.	30.873	59.318	90.191	3.115	2.631	2.909	4.610	.750	2.114
Apr.	29.225	56.959	86.184	3.094	2.612	2.873	4.301	.700	2.074
May	25.748	58.931	84.679	3.024	2.444	2.732	4.000	.550	1.977
June	23.049	54.349	77.398	2.764	2.375	2.580	3.800	.700	1.863
July	30.028	58.440	88.468	3.172	2.538	2.854	3.689	.700	1.906
Aug.	50.054	47.614	97.668	3.930	2.436	3.151	4.928	.750	2.227
Sept.	73.306	48.202	121.508	4.363	3.723	4.050	4.541	.800	2.530
Oct.	61.966	47.539	109.505	3.999	3.042	3.532	3.999	.700	2.369
Nov.	47.131	46.181	93.312	3.329	2.918	3.110	3.510	.800	2.138
Dec.	46.838	51.510	98.348	3.495	2.912	3.173	* 5.200	.350	2.688
Yearly	476.163	643.678	1,119.841	4.363	2.375	3.068	* 6.130	.350	2.147

* Partly estimated

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED IN INCHES

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in the United States and Mexico. Five stations are operated and maintained by the United States Section of the Commission, two by the U. S. Weather Bureau and one by the Mexican Section of the Commission. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on the following page.

In United States

Month	Meigs Ranch, Arizona		Jones Ranch, Arizona		Greene Cattle Company, Arizona		Nogales Sanitation Plant 2N, Arizona	
	1969	Average 1952-1969	1969	Average 1952-1969	1969	Average 1953-1969	1969	Average 1953-1969
Jan.	0.71	0.89	.60		1.80	.90	0.38	1.00
Feb.	1.05	.50	.40		.40	.57	.98	.58
Mar.	.52	.90	0		.30	.70	.50	.75
Apr.	0	.23	0	.21	0	.16	.04	.14
May	.45	.10	.60	.06		# .14	.60	.09
June	.04	.47	0		.40	.49	.07	.44
July	6.29	4.89	5.40	5.84	1.00	4.10	8.75	4.87
Aug.	4.02	4.73	10.45		1.40	3.20	5.05	4.21
Sept.	1.02	1.47	1.20			# 1.22	3.19	1.40
Oct.	0	.69	0			# .95	.01	.83
Nov.	.58	.52	.70			# .46	.77	.58
Dec.	.84	1.26	.85	1.34		# 1.06	.93	1.50
Yearly	15.52	16.65	20.20				21.27	16.39

Month	Nogales, Arizona		Canelo, Arizona		Patagonia, Arizona			
	1969	Average 1914-1969	1969	Average 1930-1969	1969	Average 1930-1969		
Jan.	0.34	1.06	0.55	1.16	0.86	1.23		
Feb.	1.10	.84	1.21	1.10	.98	1.03		
Mar.	.51	.75	.44	.75	.47	.80		
Apr.	.07	.30	.03	.37	.09	.34		
May	.55	.14	.37	.13	.42	.17		
June	T	.47	.03	.88	0	.45		
July	8.29	4.21	7.44	4.36	5.66	4.52		
Aug.	5.16	3.95	6.49	4.58	5.86	4.29		
Sept.	2.56	1.60	.99	1.66	.83	1.78		
Oct.	T	.71	.18	.85	.01	.78		
Nov.	.21	.69	.91	.76	.75	.79		
Dec.	.94	1.33	.39	1.44	.87	1.45		
Yearly	19.73	16.05	19.03	18.04	16.80	17.63		

Some months missing T Trace

In Mexico

Month	San Lázaro, Sonora	
	1969	Average 1961-1969
Jan.	0.79	0.83
Feb.	.47	.59
Mar.	.35	.67
Apr.	0	.59
May	.79	.24
June	0	.47
July	7.40	4.96
Aug.	4.17	3.46
Sept.	1.89	1.73
Oct.	0	.63
Nov.	.83	.63
Dec.	1.42	1.81
Yearly	18.11	14.09

LOCATION OF RAINFALL STATIONS IN THE SANTA CRUZ RIVER BASIN

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 1969.

In United States

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	4,985	1930	R. E. Ewing
Greene Cattle Co. (San Rafael, Arizona)	R	31° 22'	110° 35'	4,644	June 1952	I. B. & W. C.
Jones Ranch, Arizona	S	31° 22'	110° 36'	4,960	Mar. 1952	I. B. & W. C.
Meigs Ranch, Arizona	S	31° 26'	110° 36'	4,836	Mar. 1952	I. B. & W. C.
Nogales, Arizona	R	31° 21'	110° 55'	3,808	1914	I. B. & W. C.
Nogales Sanitation Plant 2N, Arizona	S	31° 21'	110° 56'	3,757	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	4,044	1930	O. J. Rothrock

In Mexico

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
San Lázaro, Sonora	S	31° 18' 54"	110° 38' 48"	4,199	Mar. 1954	I. B. & W. C. Mexican Section

S Standard 8" rain gage R Recording rain gage

TEMPERATURE, HUMIDITY, EVAPORATION, AND WIND IN THE SANTA CRUZ RIVER BASIN

Tabulated below are monthly records of temperature, humidity, evaporation, and wind at the station two miles north of the Nogales Sanitation Plant in Arizona. This station is operated and maintained by the United States Section of the Commission. Also tabulated below are the monthly records of temperature and evaporation for a station at San Lázaro, Sonora, located approximately 6.5 miles southwest of Santa Cruz, Sonora, and approximately 22 miles southeast of Nogales, Sonora. This station is operated and maintained by the Mexican Section of the Commission. The equipment at the Nogales Sanitation Plant - 2N consists of: Standard 8-inch rain gage, 48-inch diameter evaporation pan with stillwell and hook gage, maximum and minimum thermometer, anemometer (registers miles), hygrothermograph, and psychrometer, hand turbine type. The equipment at the station at San Lázaro, Sonora, consists of: maximum and minimum thermometer, standard 8-inch rain gage and a 48-inch diameter evaporation pan.

For specific location of these two stations, refer to data opposite same station name shown in "Location of Rainfall Stations", page 95 of this bulletin.

In United States

Temperature - Degrees Fahrenheit

Month	Nogales Sanitation Plant - 2N		
	1969		
	Mean	Max.	Min.
Jan.	48.9	80	14
Feb.	45.9	74	14
Mar.	47.1	95	18
Apr.	59.2	89	31
May	66.3	101	33
June	73.0	104	42
July	78.9	105	60
Aug.	79.3	101	57
Sept.	73.4	98	47
Oct.	60.9	94	29
Nov.	51.8	79	23
Dec.	47.8	80	15
Yearly	61.0	105	14

Mean Relative Humidity - Percent

Month	Nogales Sanitation Plant - 2N	
	1969	
	Max.	Min.
Jan.	100	30
Feb.	99	56
Mar.	98	34
Apr.	93	28
May	100	34
June	63	34
July	100	51
Aug.	100	56
Sept.	100	40
Oct.	100	45
Nov.	100	23
Dec.	100	54
Yearly	100	23

Evaporation - Inches

Month	Nogales Sanitation Plant - 2N	
	1969	Average #1953-1969
	Jan.	3.35
Feb.	Ø 3.96	4.64
Mar.	6.13	7.23
Apr.	9.53	9.84
May	11.33	12.52
June	15.52	13.92
July	Ø 10.43	9.87
Aug.	Ø 8.31	7.46
Sept.	Ø 7.51	7.53
Oct.	7.86	6.91
Nov.	Ø 4.58	4.33
Dec.	Ø 3.38	3.18
Yearly	91.89	90.95

Mean Wind Speed - Miles Per Hour

Month	Nogales Sanitation Plant - 2N	
	1969	Average 1953-1969
	Jan.	2.0
Feb.	2.3	2.3
Mar.	2.6	2.6
Apr.	2.3	2.5
May	2.3	2.4
June	3.1	2.3
July	1.8	1.5
Aug.	.8	.9
Sept.	Ø 1.2	1.1
Oct.	2.3	1.5
Nov.	2.0	1.5
Dec.	1.8	1.7
Yearly	2.0	1.8

In Mexico

Temperature - Degrees Fahrenheit

Month	San Lázaro, Sonora			
	1969		1961-1969	
	Max.	Min.	Max.	Min.
Jan.	79	19	93	14
Feb.	73	19	88	16
Mar.	86	21	99	21
Apr.	88	36	106	28
May	99	34	117	32
June	104	48	124	43
July	104	52	126	52
Aug.	97	61	117	52
Sept.	97	50	115	39
Oct.	90	34	111	34
Nov.	79	30	102	21
Dec.	79	21	95	14
Yearly	104	19	126	14

Evaporation - Inches

Month	San Lázaro, Sonora	
	1969	Average 1961-1969
	Jan.	3.86
Feb.	4.17	4.17
Mar.	6.85	6.93
Apr.	10.67	9.80
May	11.73	12.05
June	14.17	12.76
July	8.31	7.91
Aug.	6.97	7.09
Sept.	7.13	7.13
Oct.	7.44	7.09
Nov.	5.08	4.57
Dec.	2.87	3.38
Yearly	89.25	86.50

Ø Adjusted to full month
Some months missing

**DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS
ALONG SANTA CRUZ RIVER AND WHITEWATER DRAW**

1969

The drainage basin areas tabulated below are derived from the best available maps from both the United States and Mexico.

Data on irrigated areas in the Whitewater Draw Basin were furnished by the Smoke Control Section, Phelps-Dodge Smelter at Douglas, Arizona.

Designation of Areas	Drainage Basin-Square Miles			Irrigated Areas-Acres		
	United States	Mexico	Total	United States	Mexico	Total
Santa Cruz River:						
Above Lochiel, Arizona Gaging Station	82	0	82	200	0	200
Lochiel Station to Nogales Station	103	348	451	0	2,300	2,300
Above Nogales, Arizona Gaging Station	185	348	533	200	2,300	2,500
Whitewater Draw:						
Above Douglas, Arizona Gaging Station	1,023	0	1,023	27,500	0	27,500