

INTERNATIONAL BOUNDARY AND WATER COMMISSION  
UNITED STATES AND MEXICO

UNITED STATES SECTION

MEXICAN SECTION

CARLOS M. RAMIREZ  
*Commissioner*  
El Paso, Texas

J. ARTURO HERRERA SOLIS  
*Commissioner*  
Cd. Juarez, Chihuahua

ALTON L. GOFF  
*Chief*  
Yuma, Arizona Hydro Office

FRANCISCO A. BERNAL  
*Area Subdirector*  
Mexicali, Baja California

---

WESTERN WATER BULLETIN 2001

---

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

COLORADO RIVER

TIJUANA RIVER

SANTA CRUZ RIVER

SAN PEDRO RIVER

WHITEWATER DRAW

**2001**

## CONTENTS

Foreword and Acknowledgments . . . . .	4
General Hydrologic Conditions for 2001 . . . . .	6
Map of Western Boundary - Douglas, Arizona to Pacific Ocean . . . . .	44

## I - COLORADO RIVER - IMPERIAL DAM TO GULF OF CALIFORNIA

Map of Lower Colorado River, United States and Mexico . . . . .	Following Page	85
---	----------------	----

## QUANTITY OF WATER

Stream-Flow and Stage Records	
Tributary - Reservation Main Drain No. 4 (California Drain)	8
Yuma Main Canal Wasteway to Colorado River at Yuma, Arizona	9
Colorado River below Yuma Main Canal Wasteway at Yuma, Arizona - Discharges	10
below Yuma Main Canal Wasteway at Yuma, Arizona - Stages	11
Tributary - Yuma Mesa Outlet Drain to Colorado River near Yuma, Arizona	12
Drain No. 8-B (Araz Drain)	13
Pilot Knob Power Plant and Wasteway near Pilot Knob, California	14
Colorado River at Northerly International Boundary - Discharges	15
at Northerly International Boundary - Stages	16
Tributary - Cooper Wasteway (Valley Division, Yuma Project)	17
Colorado River immediately above Morelos Dam - Stages	18
Diversions from the Colorado River - Intake Canal at Morelos Diversion Structure - Discharges	19
at Morelos Diversion Structure - Stages	20
Colorado River immediately below Morelos Dam - Stages	21
Tributary - Wellton-Mohawk Drainage Water Discharged to Colorado River below Morelos Dam	22
Tributary - Eleven Mile Wasteway (Valley Division, Yuma Project)	23
Colorado River at Eleven Mile Gage - Stages	24
Tributary - Twenty-one Mile Wasteway (Valley Division, Yuma Project)	25
East Main Canal Wasteway (Valley Division, Yuma Project)	26
Yuma Main Drain (Valley Division, Yuma Project)	27
West Main Canal Wasteway (Valley Division, Yuma Project)	28
242 Well Field near San Luis, Arizona	29
Total Flows Crossing International Boundary into Mexico near San Luis, Sonora	30
Colorado River at Southerly International Boundary - Discharges	31
at Southerly International Boundary - Stages	32
Wellton-Mohawk Bypass Drain at Southerly International Boundary	33
Tributary - Wasteway to Colorado River at Kilometer 27 in Mexico	34
Tributary - Wasteway to Colorado River at Kilometer 38 in Mexico	35
Stored Water in Large Reservoirs of the Colorado River	36

## QUALITY OF WATER

Suspended Silt in the Colorado River and Intake Canal at Morelos Diversion Structure . . . . .	37
Chemical Analyses of Water Samples . . . . .	38
Specific Conductance of Water Samples . . . . .	39

## CLIMATOLOGICAL DATA AND IRRIGATED AREAS

Rainfall on the Colorado River Watershed . . . . .	41
Location of Rainfall Stations on the Colorado River . . . . .	42
Evaporation in the Colorado River Basin . . . . .	43
Temperature in the Colorado River Basin . . . . .	46
Irrigated Areas along the Colorado River below Imperial Dam . . . . .	48

## II - ALAMO AND NEW RIVERS

## QUANTITY OF WATER

Stream-Flow and Stage Records	
Alamo River at International Boundary . . . . .	49
New River at International Boundary . . . . .	50
Tributary - Wastes from Mexicali Potable Water Plant to New River in Mexico	51
Waste Waters from Mexican System of Canals Entering the United States	52
Salton Sea - Elevations of Water Surface . . . . .	53

## FOREWORD

## QUALITY OF WATER

Chemical Analyses of Water Samples . . . . .	54
--	----

## III - TIJUANA RIVER

Map of Tijuana River Drainage Basin . . . . .	57
---	----

## QUANTITY OF WATER

Stream-Flow Records	
Cottonwood Creek above Morena Dam, California . . . . .	58
Cottonwood Creek below Morena Dam, California . . . . .	59
Cottonwood Creek above Barrett Dam, California . . . . .	60
Diversions from Cottonwood Creek - Dulzura Conduit below Barrett Dam, California . . . . .	61
Cottonwood Creek below Barrett Dam, California . . . . .	62
Cottonwood Creek above Tecate Creek near Dulzura, California . . . . .	63
Tributary - Campo Creek near Campo, California . . . . .	64
Inflows to Rodriguez Reservoir, Baja California . . . . .	65
Diversions from Rodriguez Reservoir, Baja California . . . . .	66
Tijuana River at International Boundary . . . . .	67
Stored Water in Reservoirs, Tijuana River Basin . . . . .	68

## CLIMATOLOGICAL DATA AND DRAINAGE BASIN AND IRRIGATED AREAS

Rainfall on the Tijuana River Watershed . . . . .	69
Location of Rainfall Stations on the Tijuana River Watershed . . . . .	71
Evaporation in the Tijuana River Basin . . . . .	72
Temperature in the Tijuana River Basin . . . . .	73
Drainage Areas above Gaging Stations and Irrigated Areas along Tijuana River and Tributaries . . . . .	74

## IV - WHITEWATER DRAW, SAN PEDRO, AND SANTA CRUZ RIVERS

Map of Western Boundary - Santa Cruz River, San Pedro River, and Whitewater Draw Basins . . . . .	75
---	----

## QUANTITY OF WATER

Stream-Flow Records	
Whitewater Draw near Douglas, Arizona . . . . .	76
Sewage Influent, Douglas, Arizona International Treatment Plant . . . . .	77
San Pedro River at Palominas, Arizona . . . . .	78
Santa Cruz River near Lochiel, Arizona . . . . .	79
Santa Cruz River near Nogales, Arizona . . . . .	80
Sewage Influent, Nogales International Treatment Plant . . . . .	81

## CLIMATOLOGICAL DATA

Rainfall and Location of Rainfall Stations on the Santa Cruz River Watershed . . . . .	82
Temperature in the Santa Cruz River Basin . . . . .	83
Drainage Areas above Gaging Stations and Irrigated Areas along Santa Cruz River, San Pedro River, and Whitewater Draw . . . . .	84

## FOREWORD

This bulletin is the forty-second annual compilation of stream discharges and other hydrographic data relating to international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary of the United States and Mexico. 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 bulletin contains information for the year 2001.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records were obtained at this station from January 1878 until December 1973, when it was discontinued. 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 16 kilometers to the mouth of the Gila River, thence westward 18 kilometers to Pilot Knob Mountain, and south 1.6 kilometers 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 35 kilometers 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 145 kilometers 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 28,200 square kilometers along the river from Hoover Dam to the mouth of the Gila River. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River, draining about 1,857 square kilometers below Alamo Dam and Lake, completed in 1963; and from the Gila River, draining about 18,900 square kilometers 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 scheduled deliveries of waters of the Colorado River, which in 2001 amounted to 1,850,234 thousand cubic meters, in accordance with Article 10 of the 1944 Water Treaty. No diversions were made to a substitute canal in 2001.

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, 1.8 kilometers 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, almost all Colorado River waters diverted by Mexico (except emergency deliveries to Tijuana from August 1972 to August 1980) have been diverted to the Alamo Canal at Morelos Dam.

## TIJUANA RIVER BASIN

The total drainage area of the Tijuana River basin is 4,483 square kilometers, 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 Rio de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 34 kilometers from the Pacific Ocean to join the Rio de las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 8 kilometers to cross the land boundary into the United States near San Ysidro, California and Tijuana, Baja California, and then flows westerly 10 kilometers to discharge into the Pacific Ocean 3 kilometers 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 Rio de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

## WHITWATER 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 2,650 square kilometers. 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.

## FOREWORD

## 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 1,919 square kilometers, of which 1,681 square kilometers are in Mexico.

## 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 returning 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 1,380 square kilometers. Of this amount, 901 square kilometers 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 National Weather Service, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; the Otay Municipal Water District; and the National Water Commission 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

This Bulletin is published in System International (SI) units which are based on the metric system. The following conversion constants may be used to convert to the English system of measurement. Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units.

## METRIC TO ENGLISH CONVERSION CONSTANTS

METRIC UNITS		ENGLISH UNITS	
<u>LENGTH</u>			
Millimeters	x	0.03937	= Inches
Meters	x	3.28084	= Feet
Kilometers	x	0.62137	= Miles
<u>AREA</u>			
Square Meters	x	10.76391	= Square Feet
Hectares	x	2.47105	= Acres
Square Kilometers	x	0.38610	= Square Miles
<u>VOLUME</u>			
1,000 Cubic Meters	x	35.31467	= Cubic Feet
Cubic Meters	x	0.81071	= Acre-Feet
<u>WEIGHT</u>			
Kilograms	x	2.20462	= Pounds
Megagrams	x	1.10231	= Tons (2,000 lbs.)
<u>TEMPERATURE</u>			
Degrees Celsius	x	1.8 + 32	= Degrees Fahrenheit

## GENERAL HYDROLOGIC CONDITIONS FOR 2001

## 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 2001. In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation during 2001 measured at 3 index stations was 64 millimeters, compared to an average of 52 millimeters during the last 43 years (1959 to 2001).

The flow of the Colorado River through Imperial Dam was 7,520,705 thousand cubic meters, about 76% of the 67-year average (1935-2001) of 9,894,564 thousand cubic meters. At the Northerly International Boundary, the total flow of the river during 2001 was 1,932,214 thousand cubic meters, about 41% of the 1935-2001 average of 4,662,275 thousand cubic meters. At the Southerly International Boundary, the flow during 2001 was 122,051 thousand cubic meters, about 4% of the 1935-2001 average of 3,147,960 thousand cubic meters.

The total of all flows of the Colorado River entering Mexico in 2001 amounted to 2,225,609 thousand cubic meters, 42% of the 1935-2001 average of 5,238,297 thousand cubic meters, 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, 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, 5) in the Wellton-Mohawk Bypass Drain at the southerly land boundary near San Luis, Arizona, and 6) from the 242 Well Field near San Luis, Arizona.

During 2001, other waters arrived at the Mexican points of diversion and amounted to 247,408 thousand cubic meters. These waters consisted mainly of excess waters released from reservoirs on the Colorado River. A maximum instantaneous flow of 276 cubic meters per second occurred in the Colorado River at the Northerly International Boundary station on February 28, 2001.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 27,137.2 million cubic meters, 77% of the usable capacity of 35,263.2 million cubic meters. The greater part (24,416.7 million cubic meters) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 2001 due to drought or accident to the irrigation system.

The total reported area irrigated from waters of the Colorado River below Imperial Dam in 2001 was 423,083 hectares; 303,231 hectares in the United States and 119,852 hectares in Mexico. An estimated 33% of the total area irrigated in Mexico is served by pumping from ground water.

## TIJUANA RIVER BASIN

During 2001, the temperatures at Barrett Dam, California (elevation 533.40 meters) in the upper portion of the basin in the United States averaged 17.5 degrees Celsius, 0.9 degree Celsius above the 71-year mean. In the extreme upper portion of the basin in Mexico at El Pinal, Baja California (elevation 1394.96 meters), the recorded temperatures during the year could not be determined due to incomplete records. At Rodriguez Dam, Baja California (elevation 139.90 meters), the recorded temperatures averaged 20 degrees Celsius, about 1 degree Celsius below the normal for many years.

At Barrett Dam, in the upper portion of the basin in the United States, the recorded precipitation was 349 millimeters, 78% of normal; and at Lower Otay Dam near the lower end of the basin, 264 millimeters, or 93% of normal. The recorded precipitation at El Pinal in the upper portion of the basin in Mexico could not be determined due to incomplete records. At Rodriguez Dam, in the lower portion of the basin in Mexico, the recorded precipitation was 289 millimeters, 124% of the 63-year average.

Runoff above Barrett and Rodriguez Reservoirs during 2001 was about 26% of normal. Above Morena Reservoir, the runoff was 5,310 thousand cubic meters, or about 41% of the 65-year 1937-2001 mean of 12,946 thousand cubic meters. Above Barrett Reservoir, the runoff was 13,176 thousand cubic meters, or about 76% of the 65-year 1937-2001 mean of 17,269 thousand cubic meters. At Rodriguez Reservoir, there was no measurable runoff during the year.

The flow of the Tijuana River at the international boundary was 14,423 thousand cubic meters during 2001.

## WHITEWATER DRAW

During 2001, the average annual temperature over the watershed was 0.1 degrees Celsius above normal, while the annual precipitation was 72% of normal. Runoff for the year at the gaging station near Douglas, Arizona, was 771 thousand cubic meters, or about 12% of average.

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## GENERAL HYDROLOGIC CONDITIONS FOR 2001

## SAN PEDRO RIVER

During 2001, the average annual temperature was 0.1 degree Celsius above normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 93% of the 1961-2001 mean of 526 millimeters. The stream flow at the international boundary was 21,153 thousand cubic meters, 80% of the 1951-2001 average.

## SANTA CRUZ

During 2001, the average annual temperature over the watershed averaged 16.8 degrees Celsius, 0.6 degree Celsius above the long term average. The annual precipitation was about 101% of the 63-year 1939-2001 mean. Runoff measured at the Nogales gaging station, where the stream re-enters the United States, was 7,765 thousand cubic meters. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States, was 1,355 thousand cubic meters. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 6,410 thousand cubic meters from the loop of the river lying in Mexico, or approximately 83% of the flow reaching the Nogales Station.

## ALAMO AND NEW RIVERS

During 2001, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, was 23.5 degrees Celsius, 1.0 degree Celsius above normal; and over the drainage area of the New River as recorded at Mexicali, Baja California, it was 25 degrees Celsius, 3 degrees Celsius above the 76-year average.

At El Centro, the precipitation was 34 millimeters, about 50% of the 71-year average; and in Mexicali, the annual precipitation was 24 millimeters, 30% of the 76-year average. The total flow of the New River at the international boundary in 2001 was 179,133 thousand cubic meters, which was about 122% of the 1943-2001 average.

## SALTON SEA

During 2001, the average annual temperature around the Salton Sea was 0.6 degree Celsius above the long-term average, while the annual precipitation recorded at Brawley, California was approximately 65% of the long-term mean of 68 millimeters. The water surface of the Salton Sea dropped slightly during the year. The maximum stage, 69.310 meters below mean sea level, was recorded on April 29 through June 12 inclusive. The minimum stage, 69.645 meters below mean sea level, was recorded on December 21 and December 22.

09-5300.00 RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 152 meters upstream from railroad culvert and 1.6 kilometers northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gage. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 61.0 meters downstream from the spillway structure, and thence into the Colorado River on the right bank, 305 meters upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometers upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on current meter measurements 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 2001.

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 15,789 TCM. Monthly and annual averages since 1937 are shown in the table below.

EXTREMES: Prior to 1937: Maximum annual flow 24,904 TCM, 1916; minimum annual flow 11,003 TCM, 1913.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.93	1.50	1.84	2.04	1.84	1.93	1.98	1.30	1.61	1.50	2.07	2.07
2	1.90	1.50	1.61	2.21	1.84	1.98	2.01	1.70	1.56	1.56	2.10	2.15
3	1.87	1.53	1.56	2.04	1.84	1.98	1.98	1.93	1.67	1.53	2.15	2.04
4	1.87	1.53	1.59	2.01	1.84	1.98	1.98	1.90	1.59	1.59	2.18	2.10
5	1.84	1.50	1.59	2.04	1.81	1.98	1.93	1.95	1.64	1.59	2.21	2.07
6	1.76	1.42	1.61	2.04	1.78	1.95	1.95	1.87	1.67	1.56	2.27	2.07
7	1.81	1.47	1.61	2.10	1.78	1.95	2.04	1.84	1.70	1.50	2.29	2.15
8	1.78	1.47	1.61	2.07	1.73	2.01	2.01	1.87	1.78	1.53	2.35	2.15
9	1.78	1.47	1.76	2.04	1.73	2.01	2.04	1.87	1.98	1.59	2.38	2.21
10	1.73	1.50	1.64	1.98	1.67	2.04	2.32	1.87	1.81	1.59	2.55	2.10
11	1.64	1.47	1.70	2.01	1.64	1.93	2.04	1.95	1.70	1.67	2.58	2.12
12	1.76	1.44	1.73	2.04	1.67	1.87	2.04	2.01	1.96	1.59	2.58	2.07
13	1.67	1.47	1.73	2.01	1.73	1.93	2.01	2.01	1.84	1.56	2.66	2.10
14	1.67	1.44	1.78	1.84	1.61	1.90	2.01	2.01	2.01	1.56	2.63	2.07
15	1.56	1.47	1.78	1.78	1.64	1.90	1.95	1.93	2.01	1.53	2.69	2.10
16	1.59	1.50	1.78	1.87	1.64	1.90	1.84	1.81	1.56	1.53	2.58	2.04
17	1.56	1.47	1.81	2.07	1.67	1.95	1.70	1.84	1.78	1.59	2.44	2.01
18	1.56	1.47	1.87	1.98	1.67	1.93	1.64	2.12	1.44	1.61	2.46	1.98
19	1.50	1.47	1.90	2.04	1.64	1.95	1.81	1.73	1.47	1.56	2.61	1.98
20	1.59	1.47	1.90	1.98	1.64	1.84	1.73	1.84	1.59	1.59	2.55	2.01
21	1.53	1.47	1.90	2.07	1.73	1.87	1.64	1.81	1.53	1.78	2.69	2.07
22	1.42	1.47	1.70	1.98	1.78	1.84	1.53	1.98	1.53	1.84	2.69	1.98
23	1.56	1.50	1.70	1.95	1.67	1.84	1.50	1.81	1.67	1.70	2.63	2.01
24	1.61	1.47	1.73	1.87	1.64	1.90	1.67	1.87	2.01	1.73	2.61	1.95
25	1.56	1.47	1.73	1.87	1.64	1.98	1.73	1.87	1.84	1.78	2.61	1.95
26	1.61	1.70	1.95	1.95	1.64	1.95	1.73	1.98	1.95	1.81	2.44	1.84
27	1.61	2.04	1.84	1.95	1.67	2.01	1.47	1.95	1.76	1.87	2.63	1.81
28	1.53	2.24	1.98	1.87	1.76	2.01	1.50	1.87	1.56	1.90	2.55	1.87
29	1.56		1.98	1.90	1.73	1.93	1.44	1.78	1.59	1.93	2.58	1.78
30	1.61		2.12	1.81	1.70	1.98	1.27	1.70	1.59	1.98	1.98	1.87
31	1.56		1.98		1.78		1.16	1.67		2.01		1.81
Sum	51.53	42.92	55.01	59.41	53.15	58.22	55.65	57.64	51.40	51.66	73.74	62.53

Current Year 2001

Period 1937-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High		φ Low		Total	Average	Maximum	Minimum
				Day	φ						
Jan.			1	1.93	22	1.42	1.66	4,452	4,185	6,054	711
Feb.			28	2.24	6	1.42	1.53	3,708	3,861	5,493	456
Mar.			30	2.12	3	1.56	1.77	4,753	4,744	6,617	1,005
April			2	2.21	15	1.78	1.98	5,133	4,751	6,476	940
May			1	1.84	14	1.61	1.71	4,592	4,945	6,895	804
June			10	2.04	120	1.84	1.94	5,030	4,749	6,883	717
July			10	2.32	31	1.16	1.80	4,808	4,995	8,079	662
Aug.			18	2.12	1	1.30	1.86	4,980	5,007	8,400	698
Sept.			14	2.01	18	1.44	1.71	4,441	4,753	7,672	721
Oct.			31	2.01	1	1.50	1.67	4,463	5,000	7,080	843
Nov.			15	2.69	30	1.98	2.46	6,371	4,744	7,367	806
Dec.			9	2.21	29	1.78	2.02	5,403	4,523	6,241	783
Yearly				2.69		1.16	1.84	58,134	56,257	78,573	10,410

φ Mean daily

! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5250.00 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, 501 meters upstream from the intake of the Colorado River siphon, and 5.1 kilometers downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 305 meters upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometers 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. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 2001.

REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal. EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 367,333 TCM; maximum annual flow, 1,127,040 TCM, 1932; minimum annual flow, 141,728 TCM, 1917. Since 1935: Maximum mean daily discharge, 57.2 CMS, December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.53	2.83	13.1	4.84	4.47	2.29	1.90	1.42	3.31	2.15	7.90	2.52
2	2.63	2.72	11.6	4.98	5.27	2.52	1.56	2.04	.68	.85	7.59	2.66
3	2.38	2.72	10.3	5.47	4.42	2.38	2.35	1.81	.37	.88	8.24	1.87
4	3.17	2.69	11.2	5.07	4.96	2.61	2.41	1.95	.59	1.19	10.0	2.46
5	2.69	2.69	10.6	5.35	3.74	2.78	2.18	2.97	.31	2.75	12.4	2.97
6	1.90	2.61	9.15	5.81	2.58	2.78	5.04	1.42	.42	.93	12.1	3.74
7	2.69	3.26	3.68	6.51	1.64	2.80	2.52	1.56	.42	2.29	12.2	3.00
8	2.27	3.57	7.08	6.00	5.21	3.17	1.87	4.22	1.56	1.16	12.1	4.96
9	2.55	4.13	6.83	5.35	11.2	3.23	6.91	6.49	1.22	1.13	12.1	3.74
10	2.80	3.43	6.68	4.56	12.8	2.32	15.2	4.16	1.08	1.16	12.4	3.46
11	2.72	3.00	6.88	4.25	12.7	2.18	15.0	4.84	1.56	5.35	18.8	3.65
12	4.05	1.95	6.71	3.91	10.4	2.58	16.0	4.64	1.10	1.30	13.6	5.64
13	4.76	2.95	6.23	4.93	10.3	2.38	16.8	9.29	.91	1.25	13.8	4.93
14	4.62	3.40	5.75	5.24	14.1	2.72	16.2	16.9	.91	.96	13.5	1.59
15	3.09	4.45	5.78	4.62	13.6	2.27	8.18	9.06	.68	.71	14.5	2.46
16	2.49	4.45	7.53	3.48	12.7	2.80	1.90	7.33	.82	.88	13.5	2.55
17	3.09	4.19	7.14	3.48	12.0	2.69	1.81	.42	1.50	.88	13.7	2.75
18	1.33	5.32	.28	3.12	14.8	3.65	7.70	7.25	.28	.25	16.1	1.67
19	3.88	3.23	7.11	3.43	13.7	1.93	2.04	.28	8.10	.99	14.3	2.78
20	3.48	3.14	7.87	4.15	15.2	2.46	1.64	.59	8.47	.91	18.9	1.78
21	2.66	3.03	12.4	3.96	6.68	2.80	2.49	3.51	6.80	.51	18.4	2.63
22	2.10	3.09	17.7	3.29	11.2	2.41	2.10	13.6	7.39	1.02	20.4	1.27
23	3.17	3.14	23.7	2.89	8.30	2.38	1.90	10.1	3.91	2.15	19.9	2.49
24	3.60	3.60	25.2	8.10	5.52	2.41	1.08	7.45	7.05	1.39	16.4	4.28
25	1.56	6.37	10.5	9.43	5.52	3.34	1.95	6.29	5.15	1.19	10.2	7.99
26	1.42	8.21	10.3	4.39	14.0	1.90	.65	9.80	4.39	.59	10.2	5.32
27	3.37	9.35	14.4	3.96	8.89	2.18	1.30	8.30	1.44	3.65	3.46	2.72
28	3.31	12.8	5.30	4.76	3.57	2.18	1.76	8.16	4.84	2.10	14.4	1.53
29	2.55	5.07	4.05	4.25	7.99	2.04	.88	9.26	6.68	1.16	15.8	.74
30	2.58	4.45	2.86	2.86	16.4	1.70	2.12	5.10	6.88	2.15	3.12	.82
31	2.58	4.76	4.76	19.5	19.5	19.5	2.46	5.04	2.24	2.24	19.5	1.93
Sum	90.02	116.32	285.28	142.42	293.36	75.88	147.90	175.25	88.62	46.12	390.01	92.90

Current Year 2001

Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High		Day		Total	Average	Maximum	Minimum
				Day	φ Low						
Jan.			13	4.76	18	1.33	2.90	7,778	53,065	136,546	550
Feb.			28	12.8	12	1.95	4.15	10,050	43,356	109,952	444
Mar.			24	25.2	18	.28	9.20	24,648	43,213	111,248	440
April			25	9.43	30	2.86	4.75	12,305	42,569	106,795	402
May			31	19.5	7	1.64	9.46	25,346	50,516	108,892	411
June			18	3.65	30	1.70	2.53	6,556	44,051	107,263	422
July			13	16.8	26	.65	4.77	12,779	41,272	112,518	455
Aug.			14	16.9	19	.28	5.65	15,142	44,918	110,878	455
Sept.			20	8.47	18	.28	2.95	7,657	49,524	103,193	440
Oct.			11	5.35	18	.25	1.49	3,985	44,265	111,075	699
Nov.			22	20.4	30	3.12	13.0	33,697	45,185	125,198	882
Dec.			25	7.99	29	.74	3.00	8,027	51,476	134,203	570
Yearly				25.2		0.25	5.33	167,970	553,410	1,286,335	8,226

φ Mean daily

09-5211.00 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, 305 meters downstream from the mouth of the Yuma Main Canal Wasteway, 1.0 kilometers downstream from the abandoned gaging station on the Colorado River at Yuma, 8.4 kilometers downstream from the mouth of the Gila River, 31.5 kilometers downstream from Imperial Dam, and 10.3 kilometers upstream from the northerly international boundary. Zero of the gage is 31.09 meters above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements 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 2001. 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, power developments, transmountain diversions, reservoirs on the Gila River, irrigation diversions, and return flows modify the river flow at this station.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	25.9	23.7	57.8	24.1	24.8	24.7	24.8	30.0	31.4	25.3	25.3	20.9
2	24.8	23.2	35.1	23.4	25.9	23.4	37.9	29.7	31.4	24.0	25.3	21.4
3	24.3	23.1	32.0	23.3	25.9	23.1	25.5	29.5	32.6	23.8	26.5	20.4
4	25.0	23.3	32.0	23.3	25.9	23.3	24.8	29.2	32.6	27.0	26.1	19.8
5	23.8	23.3	31.2	23.3	24.5	23.4	25.3	27.5	31.7	26.3	28.9	19.3
6	21.4	22.8	30.0	23.3	23.9	23.5	26.6	40.8	31.4	23.6	29.5	18.6
7	21.5	24.0	29.5	24.1	25.9	23.2	25.5	32.9	31.7	22.3	29.7	17.8
8	20.5	23.3	35.1	23.9	36.8	22.8	25.9	27.5	30.9	22.5	29.7	18.7
9	20.5	23.9	50.4	23.3	34.3	23.7	54.9	33.1	28.6	22.4	29.7	18.8
10	20.0	24.3	32.0	22.8	34.0	23.1	82.1	39.1	28.3	22.9	29.5	18.2
11	19.4	23.6	28.0	22.3	34.3	22.2	62.6	47.6	28.3	27.7	35.7	18.3
12	22.0	22.6	27.2	21.7	32.6	22.3	44.2	52.1	40.5	22.0	34.6	18.2
13	22.2	22.7	26.5	22.5	31.7	22.3	39.4	51.0	38.5	19.8	33.7	18.3
14	22.5	21.9	25.3	34.3	35.4	21.2	37.9	52.4	49.0	19.4	32.9	18.4
15	20.6	23.1	24.6	51.0	34.6	20.8	30.9	48.1	54.9	19.1	32.9	17.7
16	19.7	24.7	25.3	54.7	33.7	21.2	26.2	42.1	33.7	18.8	32.6	17.3
17	19.9	24.4	25.1	27.4	32.9	21.2	23.6	41.1	37.4	19.3	32.3	17.2
18	19.8	23.9	25.6	26.0	34.8	21.7	23.6	45.9	31.2	19.3	32.6	17.5
19	20.2	23.7	25.1	26.4	33.7	21.6	24.6	34.8	30.6	18.9	32.6	17.9
20	20.2	23.8	25.0	26.5	34.6	21.3	23.5	39.9	31.4	20.2	32.9	17.8
21	19.5	23.4	28.6	27.2	46.7	21.4	24.2	35.1	30.6	29.7	34.3	18.1
22	19.0	22.9	33.4	25.6	51.8	20.8	24.0	40.5	29.7	32.0	34.8	17.6
23	21.1	23.9	38.5	25.9	41.9	20.7	24.1	34.0	34.8	25.7	34.6	18.1
24	23.0	23.2	41.1	31.2	38.2	21.2	30.3	30.0	57.8	36.5	39.1	19.1
25	23.2	23.2	40.8	33.4	36.2	21.9	38.8	30.0	38.5	31.4	38.8	19.9
26	23.2	42.5	62.3	27.5	35.4	22.0	40.5	29.7	49.0	24.5	34.6	18.1
27	23.6	74.8	37.4	26.1	38.8	25.6	25.7	29.7	38.2	23.7	44.5	17.5
28	22.3	104	23.3	25.8	48.7	27.4	26.2	29.7	28.6	25.6	35.4	17.4
29	23.3		23.3	26.0	45.9	23.4	32.3	30.3	28.6	27.2	33.4	17.2
30	24.4		23.6	24.7	40.2	22.7	27.9	33.4	28.6	22.4	19.7	17.4
31	23.9		31.4		41.3		25.1	28.3		21.4		17.8
Sum	680.7	807.2	1,006.5	821.0	1,085.3	677.1	1,008.9	1,114.9	1,050.5	744.7	962.2	570.7

Current Year 2001

Period 1951-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			1	25.9	22	19.0	22.0	58,812	262,201	1,317,479	36,828
Feb.			28	104	14	21.9	28.8	69,742	214,566	1,228,424	41,083
Mar.			26	62.3	128	23.3	32.5	86,962	236,401	1,610,496	42,683
April			16	54.7	12	21.7	27.4	70,934	211,290	1,119,312	41,552
May			22	51.8	6	20.2	35.0	93,770	210,032	1,065,554	43,373
June			28	27.4	23	20.7	22.6	58,501	205,041	1,113,679	36,996
July			10	82.1	20	23.5	32.5	87,169	231,364	2,013,773	37,956
Aug.			14	52.4	15	27.5	36.0	96,327	236,983	2,073,958	41,457
Sept.			24	57.8	110	28.3	35.0	90,763	213,402	1,669,785	53,264
Oct.			24	36.5	16	18.8	24.0	64,342	184,166	1,789,911	43,129
Nov.			27	44.5	30	19.7	32.1	83,134	186,592	1,292,035	42,965
Dec.			2	21.4	117	17.2	18.4	49,308	126,808	1,374,775	40,733
Yearly				104		17.2	28.8	909,764	2,608,846	13,065,596	633,707

φ Mean daily

! And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5211.01 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY  
AT YUMA, ARIZONA - STAGES

(See Preceding Page for Description)

## MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.440	3.390	4.015	3.410	3.340	3.380	3.370	3.470	3.495	3.390	3.405	3.290
2	3.415	3.385	3.620	3.390	3.360	3.355	3.645	3.705	3.495	3.360	3.405	3.300
3	3.410	3.380	3.565	3.390	3.360	3.345	3.385	3.930	3.515	3.355	3.430	3.275
4	3.425	3.380	3.565	3.390	3.360	3.355	3.360	3.445	3.520	3.430	3.420	3.265
5	3.400	3.385	3.550	3.390	3.325	3.360	3.365	3.410	3.500	3.415	3.475	3.250
6	3.355	3.375	3.530	3.390	3.315	3.365	3.390	3.680	3.495	3.355	3.485	3.240
7	3.355	3.390	3.515	3.410	3.355	3.360	3.370	3.520	3.500	3.320	3.490	3.220
8	3.335	3.385	3.625	3.400	3.585	3.350	3.375	3.410	3.485	3.330	3.485	3.240
9	3.340	3.390	3.900	3.390	3.535	3.375	3.930	3.530	3.440	3.330	3.485	3.240
10	3.330	3.400	3.565	3.375	3.535	3.360	4.370	3.650	3.435	3.340	3.475	3.225
11	3.315	3.385	3.485	3.365	3.540	3.345	4.055	3.805	3.435	3.445	3.585	3.230
12	3.365	3.370	3.470	3.350	3.510	3.345	3.745	3.890	3.680	3.320	3.555	3.225
13	3.370	3.370	3.455	3.370	3.495	3.350	3.655	3.870	3.650	3.265	3.540	3.225
14	3.375	3.355	3.430	3.625	3.570	3.325	3.625	3.895	3.840	3.255	3.515	3.225
15	3.340	3.375	3.410	3.940	3.555	3.315	3.480	3.815	3.945	3.250	3.515	3.210
16	3.320	3.410	3.430	3.925	3.540	3.330	3.385	3.510	3.545	3.240	3.505	3.195
17	3.320	3.400	3.425	3.410	3.525	3.330	3.320	3.690	3.630	3.260	3.500	3.195
18	3.320	3.390	3.435	3.375	3.565	3.345	3.325	3.775	3.505	3.260	3.510	3.200
19	3.330	3.390	3.425	3.385	3.550	3.345	3.345	3.565	3.490	3.245	3.510	3.215
20	3.330	3.390	3.425	3.385	3.565	3.340	3.320	3.665	3.510	3.285	3.515	3.210
21	3.315	3.385	3.505	3.400	3.800	3.340	3.340	3.570	3.495	3.500	3.540	3.220
22	3.305	3.375	3.605	3.365	3.890	3.320	3.335	3.675	3.475	3.545	3.550	3.205
23	3.345	3.390	3.700	3.370	3.715	3.310	3.335	3.550	3.580	3.415	3.550	3.220
24	3.380	3.380	3.755	3.480	3.645	3.315	3.470	3.470	4.000	3.635	3.635	3.245
25	3.380	3.375	3.745	3.525	3.615	3.330	3.645	3.470	3.660	3.535	3.630	3.260
26	3.380	3.745	4.105	3.405	3.595	3.330	3.670	3.460	3.850	3.390	3.545	3.215
27	3.390	4.295	3.675	3.370	3.665	3.410	3.375	3.465	3.650	3.370	3.740	3.200
28	3.370	4.615	3.380	3.360	3.845	3.445	3.365	3.460	3.455	3.410	3.565	3.200
29	3.385		3.380	3.370	3.805	3.350	3.515	3.470	3.455	3.445	3.525	3.195
30	3.400		3.385	3.335	3.695	3.330	3.385	3.535	3.465	3.340	3.260	3.200
31	3.390		3.555		3.720		3.360	3.430		3.315		3.205
Avg.	3.360	3.475	3.570	3.435	3.565	3.350	3.505	3.605	3.575	3.365	3.510	3.225

09-5302.00 YUMA MESA OUTLET DRAIN  
TO COLORADO RIVER NEAR YUMA, ARIZONA

DESCRIPTION: Venturi meter with recorder 0.5 kilometer from outlet to Colorado River, 0.8 kilometer west of Joe Henry Memorial Park in Yuma, Arizona. Outlet is 2.7 kilometers downstream from the mouth of Yuma Main Canal Wasteway.  
RECORDS: Records are furnished by U. S. Geological Survey. Records available: July 1970 through 2001. Prior to July 21, 1972, records furnished by U. S. Bureau of Reclamation.  
REMARKS: Records show water pumped from wells on the Yuma Mesa and conveyed by underground conduit to Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.42	1.30	1.70	2.01	2.89	2.72	2.80	2.04	2.04	2.80	2.61	2.83
2	1.56	1.47	1.76	2.01	2.75	2.72	2.80	1.95	2.04	2.80	2.61	2.83
3	1.56	1.47	1.76	2.04	2.66	2.72	2.80	1.90	2.04	2.72	2.61	2.83
4	1.64	1.47	1.76	2.10	2.66	2.72	2.80	1.90	2.04	2.69	2.61	2.83
5	1.67	1.47	1.76	2.12	2.66	2.72	2.80	1.90	2.04	2.69	2.61	2.83
6	1.67	1.47	1.78	2.18	2.66	2.72	2.80	1.90	2.18	2.69	2.61	2.83
7	1.67	1.47	1.76	2.18	2.66	2.72	2.80	1.90	2.27	2.69	2.61	2.83
8	1.61	1.47	1.78	2.18	2.75	2.72	2.80	1.90	2.27	2.69	2.61	2.83
9	1.56	1.47	1.84	2.18	2.89	2.72	2.80	1.90	2.27	2.69	2.61	2.83
10	1.56	1.47	1.84	2.18	2.89	2.72	2.80	1.90	2.18	2.69	2.61	2.83
11	1.56	1.47	1.84	2.27	2.89	2.72	2.80	1.90	2.24	2.69	2.61	2.83
12	1.56	1.47	1.78	2.38	2.89	2.72	2.80	1.90	2.27	2.63	2.61	2.83
13	1.56	1.47	1.76	2.38	2.89	2.80	2.80	1.87	2.27	2.61	2.66	2.83
14	1.56	1.47	1.76	2.38	2.89	2.83	2.80	1.95	2.27	2.61	2.72	2.83
15	1.56	1.47	1.67	2.38	2.89	2.83	2.80	2.01	2.27	2.52	2.72	2.83
16	1.56	1.47	.57	2.29	2.89	2.83	2.69	2.01	2.27	2.55	2.72	2.83
17	1.56	1.47	0	2.27	2.89	2.83	2.58	2.01	2.27	2.58	2.72	2.83
18	1.56	1.47	0	2.35	2.89	2.78	2.41	2.01	2.61	2.63	2.78	2.83
19	1.56	1.47	0	2.38	2.89	2.78	2.80	2.01	2.80	2.72	2.78	2.83
20	1.56	1.47	0	2.38	2.89	2.78	2.46	2.01	2.80	2.72	2.89	2.83
21	1.56	1.47	0	2.38	2.89	2.83	2.04	2.01	2.80	2.72	2.89	2.83
22	1.61	1.47	0	2.38	2.89	2.83	2.04	2.01	2.80	2.63	2.89	2.83
23	1.70	1.47	0	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
24	1.70	1.47	.85	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
25	1.70	1.47	1.47	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
26	1.70	1.56	1.47	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
27	1.70	1.61	1.47	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
28	1.70	1.59	1.67	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
29	1.70		1.78	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
30	1.64		2.01	2.38	2.89	2.83	2.04	2.01	2.80	2.61	2.89	2.83
31	1.61		2.01		2.89		2.04	2.01		2.61		2.83
Sum	49.84	41.34	39.85	68.44	88.16	83.40	77.38	60.98	73.44	82.25	82.21	87.75

Current Year 2001

Period 1971-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			123	1.70	1	1.42	1.61	4,306	2,927	7,204	0
Feb.			27	1.61	1	1.30	1.48	3,572	2,754	5,958	0
Mar.			130	2.01	117	0	1.29	3,443	3,114	6,698	4.9
April			112	2.38	1	2.01	2.28	5,913	3,118	6,315	299
May			1	2.89	13	2.66	2.84	7,617	3,145	7,617	0
June			114	2.83	1	2.72	2.78	7,206	2,915	7,206	0
July			1	2.80	121	2.04	2.50	6,686	3,101	6,796	613
Aug.			1	2.04	13	1.87	1.97	5,269	3,153	7,401	222
Sept.			119	2.80	1	2.04	2.45	6,345	3,069	7,253	0
Oct.			1	2.80	15	2.52	2.65	7,106	3,177	7,106	194
Nov.			120	2.89	1	2.61	2.74	7,103	3,217	7,103	386
Dec.			1	2.83	1	2.83	2.83	7,580	3,443	7,580	0
Yearly				2.89		0	2.29	72,146	37,133	72,381	2,162

φ Mean daily

! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5305.00 DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 6.4 kilometers downstream from Colorado River below Yuma Main Canal Wasteway, and 4.0 kilometers upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."

RECORDS: Records are furnished by the U. S. Geological Survey from current meter measurements during the year. Records available: May 1948 through 2001.

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 975 meters upstream, is affected by backwater from the river during ordinary high stages.

EXTREMES: Mean daily discharge: Maximum, 0.85 CMS on May 31, 2000; minimum no flow several days in February 1966.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.25	0.25	0.22	0.24	0.24	0.24	0.28	0.34	0.34	0.40	0.45	0.37
2	.25	.25	.22	.24	.24	.24	.28	.34	.34	.40	.45	.37
3	.25	.25	.22	.24	.24	.24	.28	.34	.31	.40	.45	.37
4	.25	.25	.22	.24	.24	.24	.28	.34	.31	.40	.42	.37
5	.25	.25	.22	.24	.24	.24	.28	.34	.31	.40	.42	.37
6	.25	.25	.22	.24	.24	.25	.28	.34	.31	.42	.42	.37
7	.25	.25	.22	.24	.24	.25	.28	.34	.31	.42	.42	.37
8	.25	.25	.22	.24	.24	.25	.28	.34	.31	.42	.40	.37
9	.25	.25	.22	.24	.24	.25	.28	.34	.31	.45	.40	.37
10	.25	.25	.22	.24	.24	.25	.28	.34	.34	.45	.40	.37
11	.25	.25	.22	.24	.24	.25	.28	.34	.34	.48	.40	.37
12	.25	.25	.22	.24	.24	.25	.28	.34	.34	.48	.40	.34
13	.25	.25	.22	.24	.24	.25	.28	.34	.34	.48	.42	.31
14	.25	.25	.22	.24	.24	.26	.28	.34	.37	.51	.42	.31
15	.25	.25	.22	.24	.24	.26	.28	.34	.37	.51	.42	.31
16	.25	.25	.22	.24	.24	.26	.28	.34	.37	.51	.42	.31
17	.25	.25	.22	.24	.24	.26	.28	.34	.37	.51	.42	.31
18	.25	.25	.22	.24	.24	.26	.28	.34	.40	.51	.42	.31
19	.25	.25	.22	.24	.24	.26	.28	.34	.40	.51	.42	.28
20	.25	.25	.22	.24	.24	.27	.28	.34	.40	.51	.40	.28
21	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
22	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
23	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
24	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
25	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
26	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
27	.25	.25	.22	.24	.24	.27	.31	.34	.40	.48	.40	.28
28	.25	.25	.22	.24	.24	.28	.31	.34	.40	.48	.37	.28
29	.25	.25	.22	.24	.24	.28	.31	.34	.40	.48	.37	.28
30	.25	.25	.22	.24	.24	.28	.31	.34	.40	.48	.37	.28
31	.25	.25	.22	.24	.24	.28	.34	.34	.40	.48	.37	.28
Sum	7.75	7.00	6.82	7.20	7.44	7.76	9.04	10.54	10.89	14.45	12.28	9.91

Current Year 2001

Period 1948-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High		φ Low		Total	Average	Maximum	Minimum
				Day	φ						
Jan.			! 1	0.25	! 1	0.25	0.25	670	507	1,337	48.5
Feb.			! 1	.25	! 1	.25	.25	605	427	920	50.0
Mar.			! 1	.22	! 1	.22	.22	589	499	1,052	77.3
April			! 1	.24	! 1	.24	.24	622	504	1,233	82.4
May			! 1	.24	! 1	.24	.24	643	539	1,551	71.9
June			! 28	.28	! 1	.24	.26	670	520	1,270	83.1
July			! 31	.34	! 1	.28	.29	781	586	1,554	89.8
Aug.			! 1	.34	! 1	.34	.34	911	647	1,665	91.0
Sept.			! 18	.40	! 3	.31	.36	941	660	1,690	66.1
Oct.			! 14	.51	! 1	.40	.47	1,248	741	1,505	68.2
Nov.			! 1	.45	! 28	.37	.41	1,061	684	1,530	71.2
Dec.			! 1	.37	! 19	.28	.32	856	592	1,295	52.1
Yearly				0.51		0.22	0.30	9,597	6,906	15,331	955

φ Mean daily ! And other days

09-5270.00 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, 33.5 kilometers downstream from the intake at Imperial Dam, 9.7 kilometers west of Yuma, about 1.6 kilometers north of the northerly international boundary and empties into the old Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about 1.6 kilometers upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 168 meters upstream from wasteway gates and 549 meters from the entrance to the power plant. Datum of gage is 45.72 meters above mean sea level. Tailrace gage is on left bank, 207 meters 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 45.07 meters, 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 2001. 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, 281 CMS on October 6, 1985; minimum daily discharge, no flow during long periods.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	76.2	51.3	120	54.4	32.9	24.6	30.9	22.2	0	0	0	22.2
2	53.5	54.7	105	57.8	31.2	25.1	25.3	22.1	0	0	0	22.2
3	59.2	48.7	64.3	57.5	32.3	25.3	32.0	22.2	0	0	0	25.8
4	47.6	48.7	53.2	57.8	26.8	25.3	34.6	22.1	0	0	0	29.2
5	39.6	50.1	57.8	58.6	22.9	25.3	34.3	22.1	0	0	0	27.4
6	39.6	48.7	60.0	57.8	22.2	25.3	33.7	22.7	0	0	0	30.6
7	39.6	48.7	82.4	56.9	22.2	25.3	33.7	23.1	0	0	0	30.9
8	36.5	48.7	86.9	64.6	11.1	25.3	34.0	22.1	0	0	0	31.4
9	35.4	48.7	110	60.0	0	26.1	22.9	22.7	0	0	0	30.6
10	41.3	48.7	85.8	57.5	0	25.3	22.8	0	0	0	0	31.4
11	68.5	53.2	85.5	56.1	0	28.6	22.7	0	0	0	0	31.7
12	64.3	53.8	65.4	57.5	0	28.6	22.7	0	0	0	0	32.6
13	76.7	64.0	65.1	55.8	0	28.3	22.8	0	0	0	0	32.6
14	65.1	75.3	65.4	53.2	0	29.5	22.8	0	0	0	0	32.6
15	43.0	56.4	63.2	54.7	0	29.7	23.3	0	0	0	0	32.3
16	41.6	54.9	63.2	56.5	0	29.2	29.7	0	0	0	0	31.2
17	44.7	53.8	63.2	57.6	0	29.7	28.6	0	0	0	0	31.2
18	57.8	53.2	72.8	56.4	0	33.7	30.9	0	0	0	0	30.3
19	70.8	62.0	68.0	56.4	0	32.9	28.9	0	0	0	0	30.0
20	45.9	70.2	64.3	56.4	0	34.0	26.5	0	0	0	0	30.6
21	45.9	70.5	59.8	56.4	0	34.3	26.8	0	0	0	0	30.6
22	45.9	77.6	53.0	74.8	0	34.3	26.6	0	0	0	0	30.6
23	45.9	71.6	47.0	70.0	0	35.4	26.8	0	0	0	0	32.3
24	45.9	69.7	43.0	56.9	0	32.9	25.7	0	0	0	0	49.8
25	45.9	60.9	44.5	45.6	0	32.3	25.4	0	0	0	0	40.8
26	47.6	88.1	41.9	44.7	0	32.3	25.4	0	0	0	0	26.0
27	56.9	106	54.4	45.6	0	30.3	25.5	0	0	0	0	30.0
28	52.1	118	75.0	45.3	0	26.5	22.3	0	0	0	0	22.2
29	45.9	63.2	63.2	44.5	0	30.3	22.8	0	0	0	0	22.2
30	47.9	62.0	62.0	46.2	0	29.7	24.4	0	0	0	26.6	22.2
31	40.9	54.9	54.9	0	0	0	24.4	0	0	0	0	23.6
Sum	1,576.9	1,756.2	2,100.2	1,673.5	201.6	875.4	839.2	201.3	0	0	26.6	927.7

Current Year 2001

Period 1944-2001

Month	Extreme Gate Meters		Extreme-Cubic Meters per Second				Volume-Thousand Cubic Meters				
	High	Low	Day	φ High	Day	φ Low	Average	Total	Average	Maximum	Minimum
Jan.			13	76.7	9	35.4	50.9	136,244	115,569	643,620	0
Feb.			28	118	13	48.7	62.7	151,736	94,545	579,127	0
Mar.			1	120	26	41.9	67.7	181,457	147,013	501,939	0
April			22	74.8	29	44.5	55.8	144,590	152,723	447,013	0
May			1	32.9	19	0	6.50	17,418	76,023	454,461	0
June			23	35.4	1	24.6	29.2	75,635	114,943	501,523	0
July			4	34.6	28	22.3	27.1	72,507	162,766	512,385	0
Aug.			7	23.1	110	0	6.49	17,392	157,963	498,782	0
Sept.			1	0	1	0	0	0	100,223	591,679	0
Oct.			1	0	1	0	0	0	71,731	617,269	0
Nov.			30	26.6	1	0	.89	2,298	70,825	609,196	0
Dec.			24	49.8	1	22.2	29.9	80,153	109,832	700,894	0
Yearly				120		0	27.9	879,430	1,374,156	6,000,505	0

φ Mean daily ! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5220.00 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, about 10.3 kilometers downstream from Colorado River below Yuma Main Canal Wasteway, 8.0 kilometers west of Yuma, Arizona, 1.8 kilometers upstream from Morelos Diversion Structure, and about 1.6 kilometers downstream from Rockwood Gate. Zero of the gage is at mean sea level, U. S. C. & G. S. datum. On May 1, 1988, the gage was relocated 52 meters upstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is equal to that of the old gage. Station is operated by the United States Section of the Commission.

RECORDS: Based on 185 current meter measurements during the year, 121 by the United States Section, 62 by the Mexican Section of the Commission, 2 by the U. S. Geological Survey, and a continuous record of gage heights. Discharges are computed on the basis of a water-stage recorder 512 meters 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 2001; daily discharge records available January 1, 1950 through 2001.

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 2001 the flow at this point represented the total amount of the Colorado River water which crossed the northerly international boundary.

EXTREMES: Prior to January 1935: Maximum instantaneous discharge estimated about 7,080 CMS, January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 16,581,806 TCM; maximum annual flow 31,429,325 TCM, 1907; minimum annual flow 1,448,117 TCM, 1934. Since January 1935: Maximum instantaneous discharge 1,150 CMS on August 20, 1983, minimum discharge, no flow during April 1935.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	84.8	* 73.0	204 *	90.5	* 57.9	* 51.8	55.3	53.2	40.6	* 34.5	31.2	45.5
2	* 67.5	76.6	160 *	* 91.9	57.3	50.3	* 66.6	* 55.3	40.6	* 34.0	32.2	46.3
3	73.1	69.9	102	* 92.3	57.8	50.3	* 57.6	* 49.8	41.8	33.2	35.1	49.7
4	* 67.5	69.7	83.9	92.2	* 54.2	* 50.5	* 58.3	52.7	* 41.9	* 35.1	35.2	52.1
5	* 60.6	* 73.9	* 88.0	* 93.1	47.5	* 50.5	58.4	50.8	41.1	34.7	35.2	51.7
6	58.4	* 70.7	* 87.7	91.7	46.1	50.8	* 58.1	* 68.7	* 40.9	31.9	37.3	52.3
7	58.2	71.9	114	92.3	* 47.4	* 50.6	61.0	* 61.6	41.6	29.6	37.0	51.6
8	* 56.8	* 70.9	125 *	97.0	* 50.5	* 50.2	58.7	50.0	41.5	28.4	36.5	52.9
9	* 55.8	* 72.1	178 *	* 94.4	38.4	51.9	* 79.1	* 58.7	38.7	* 29.5	36.2	51.2
10	* 59.8	72.2	133	* 91.0	* 38.5	51.1	104 *	* 45.6	* 39.1	32.2	36.1	52.8
11	* 88.9	75.9	125	88.2	38.8	* 53.2	93.3	50.1	* 38.3	* 38.5	41.2	52.4
12	* 85.9	* 77.7	* 95.2	* 88.9	36.7	* 53.2	* 73.0	58.6	48.0	32.9	42.7	52.6
13	104	88.8	* 88.4	89.9	35.1	53.4	* 63.2	* 57.6	* 46.8	28.5	39.1	53.0
14	93.0	100	86.7	96.9	* 39.3	* 53.4	61.7	* 58.4	55.9	28.2	40.7	53.5
15	61.5	* 79.2	* 88.3	114	39.0	53.5	56.8	55.9	65.4	* 28.2	38.5	52.4
16	* 56.4	* 78.4	* 88.9	123 *	37.9	53.4	* 55.2	* 40.8	42.6	* 27.4	39.8	51.0
17	* 63.6	78.3	87.7	* 92.3	* 36.9	53.8	54.0	46.0	* 46.3	28.1	39.4	51.1
18	* 76.8	78.1	101	* 86.4	39.3	* 56.7	55.0	52.2	* 40.9	* 28.5	39.3	50.8
19	* 93.3	87.9	* 99.2	* 87.6	39.2	* 56.5	* 54.5	42.8	38.6	* 27.4	40.3	50.3
20	66.1	* 98.1	* 94.8	87.7	39.3	56.5	* 52.8	* 46.7	* 39.9	29.4	38.8	50.4
21	65.4	97.7	95.8	89.3	* 52.7	* 56.7	53.3	* 42.5	* 39.5	39.8	41.7	51.3
22	* 65.3	103 *	* 94.8	104	57.0	55.9	52.8	46.6	38.6	* 43.8	42.3	50.5
23	* 66.7	101	* 94.1	102 *	49.7	56.0	* 53.2	* 42.4	41.2	* 37.1	43.1	53.4
24	69.3	96.9	92.3	* 93.9	* 45.3	55.7	* 56.5	38.9	* 67.3	* 48.5	46.7	64.8
25	* 68.9	85.9	93.0	* 80.2	* 42.7	* 54.8	64.9	38.6	* 47.7	* 43.4	47.8	55.3
26	* 72.7	129	113 *	* 71.8	41.0	* 54.9	* 72.7	38.3	56.2	31.4	44.0	49.3
27	86.0	190 *	104	* 69.3	42.7	55.6	* 52.5	* 38.4	* 49.9	30.2	50.3	50.0
28	78.5	242 *	107	69.3	53.1	* 55.6	53.5	* 38.6	* 38.6	30.3	46.0	43.4
29	* 70.1		* 95.2	66.1	* 47.4	* 54.9	58.7	38.7	38.2	* 37.3	42.3	42.9
30	72.5		* 94.2	* 68.4	46.6	53.8	* 51.9	* 42.3	38.6	27.2	48.6	43.9
31	75.0		97.3		* 49.2		* 51.4	38.0		24.2		45.8
Sum	2,222.4	2,608.8	3,311.5	2,695.6	1,404.5	1,605.5	1,898.0	1,498.8	1,326.3	1,013.4	1,204.6	1,574.2

Current Year 2001

Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High		Total		Average	Maximum	Minimum	
				Day	Low						
Jan.	33.170	31.955	118	122	16	50.5	71.7	192,015	488,198	2,027,841	39,348
Feb.	32.945	32.045	28	276	1	68.1	93.2	225,400	419,456	1,705,506	74,502
Mar.	32.900	32.150	1	247	4	80.7	107	286,114	449,715	1,642,378	23,930
April	32.465	32.035	23	146	26	64.0	89.9	232,900	370,251	1,322,616	0
May	32.070	31.730	1	67.5	9	30.0	45.3	121,349	350,714	1,419,735	88,077
June	31.970	31.780	19	58.8	1	35.0	53.5	138,715	349,843	1,629,906	10,485
July	32.300	31.875	10	108	28	47.8	61.2	163,987	371,940	2,303,937	30,097
Aug.	32.055	31.740	6	77.6	31	36.5	48.3	129,496	379,862	2,485,718	54,026
Sept.	32.050	31.740	24	77.1	19	36.3	44.2	114,592	338,265	2,286,076	66,424
Oct.	31.940	31.650	24	56.6	31	23.2	32.7	87,558	327,192	2,417,702	52,985
Nov.	32.050	31.715	27	56.1	1	26.7	40.2	104,077	361,721	1,889,976	51,070
Dec.	32.270	31.865	24	75.4	128	41.7	50.8	136,011	455,118	2,259,735	51,806
Yearly	33.170	31.650		276		23.2	61.3	1,932,214	4,662,275	19,033,104	890,696

! And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 09-5220.01 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

## MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	33.120	31.735	32.215	31.740	31.495	31.410	31.455	31.535	31.340	31.380	31.480	31.750
2	33.025	31.785	31.870	31.760	31.455	31.395	31.635	31.545	31.350	31.425	31.555	31.765
3	33.060	31.700	31.840	31.770	31.455	31.400	31.520	31.430	31.425	31.375	31.605	31.830
4	33.025	31.700	31.840	31.750	31.430	31.405	31.515	31.485	31.430	31.365	31.600	31.870
5	32.980	31.760	31.880	31.740	31.385	31.395	31.510	31.505	31.420	31.365	31.585	31.865
6	32.970	31.725	31.780	31.735	31.360	31.400	31.510	31.670	31.415	31.340	31.630	31.865
7	32.965	31.745	31.555	31.740	31.395	31.400	31.570	31.610	31.425	31.275	31.625	31.850
8	32.885	31.725	31.445	31.785	31.460	31.395	31.545	31.490	31.440	31.220	31.610	31.850
9	32.295	31.735	31.965	31.800	31.300	31.415	31.700	31.580	31.365	31.280	31.610	31.860
10	31.630	31.730	31.680	31.715	31.305	31.405	31.775	31.440	31.375	31.345	31.605	31.880
11	31.765	31.755	31.635	31.685	31.320	31.430	31.800	31.460	31.355	31.470	31.680	31.865
12	31.815	31.770	31.850	31.685	31.300	31.435	31.660	31.560	31.480	31.395	31.715	31.860
13	31.820	31.890	31.680	31.710	31.265	31.435	31.625	31.540	31.515	31.300	31.630	31.860
14	31.825	31.990	31.645	31.795	31.325	31.430	31.585	31.535	31.575	31.260	31.690	31.870
15	31.630	31.815	31.735	31.970	31.345	31.430	31.535	31.525	31.630	31.275	31.650	31.860
16	31.575	31.800	31.790	31.965	31.310	31.430	31.505	31.320	31.400	31.295	31.685	31.845
17	31.630	31.795	31.775	31.795	31.285	31.445	31.495	31.390	31.510	31.330	31.675	31.850
18	31.690	31.775	31.840	31.745	31.295	31.490	31.510	31.535	31.450	31.395	31.670	31.860
19	31.735	31.880	31.810	31.735	31.315	31.485	31.515	31.400	31.365	31.380	31.690	31.845
20	31.670	31.970	31.850	31.740	31.325	31.485	31.475	31.475	31.380	31.420	31.640	31.835
21	31.655	31.965	31.840	31.765	31.450	31.490	31.460	31.385	31.425	31.570	31.695	31.875
22	31.655	32.010	31.830	31.860	31.490	31.475	31.480	31.470	31.420	31.615	31.715	31.875
23	31.675	31.995	31.800	31.875	31.400	31.475	31.490	31.395	31.440	31.515	31.720	31.915
24	31.720	31.970	31.770	31.805	31.350	31.475	31.535	31.320	31.680	31.670	31.755	32.090
25	31.715	31.850	31.775	31.660	31.330	31.455	31.640	31.295	31.550	31.600	31.785	31.970
26	31.740	32.015	31.865	31.630	31.310	31.440	31.665	31.295	31.635	31.505	31.740	31.835
27	31.785	32.125	31.890	31.610	31.335	31.415	31.425	31.335	31.585	31.475	31.805	31.805
28	31.765	32.400	31.930	31.620	31.485	31.405	31.425	31.355	31.395	31.460	31.765	31.740
29	31.690		31.815	31.605	31.415	31.425	31.565	31.340	31.345	31.610	31.695	31.735
30	31.715		31.780	31.640	31.395	31.430	31.495	31.415	31.375	31.450	31.795	31.755
31	31.730		31.825		31.385		31.505	31.335		31.370		31.785
Avg.	32.065	31.860	31.800	31.750	31.370	31.435	31.550	31.450	31.450	31.410	31.670	31.850

WESTERN BOUNDARY WATER BULLETIN - 2001 INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5318.50 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 0.8 kilometer downstream from the northerly international boundary and 1.0 kilometer upstream from Morelos Diversion Dam. Prior to July 14, 1971, the wasteway was located 0.6 kilometer downstream from Morelos Diversion Dam. This wasteway discharges waste water from the Valley Division of the Yuma Project in the United States into the Colorado River. Since July 14, 1971, zero of the gage is 35.86 meters above mean sea level, U. S. C. & G. S. datum.

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 2001 obtained by the United States Section; monthly discharge, January 1934 through 1950 by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge 1,127 TCM in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 2.25 CMS on June 19, 1965, at a maximum gage height of 34.785 meters (old datum); minimum instantaneous discharge, zero during parts of most months.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.01	0	0	0.01	0.01	0	0	0	0	0	0.03
2	0	.01	0	.04	.02	.01	.07	0	0	.02	0	.06
3	.01	.02	0	.02	0	.01	0	0	0	.26	0	0
4	.29	.01	0	0	0	.02	0	0	0	.21	0	0
5	.42	.02	0	0	0	.02	.01	0	.02	.04	0	0
6	.07	.02	0	0	0	0	0	0	.01	.08	0	.01
7	.01	.02	.01	0	.05	.02	.01	0	0	.05	0	0
8	0	.01	0	0	.02	.01	.10	0	.01	.18	0	0
9	.07	0	0	0	.01	.01	.02	0	.01	.04	0	.12
10	.03	.01	0	0	.01	.01	.03	0	0	.08	0	.01
11	0	.01	0	0	.12	0	0	0	0	.04	.03	.04
12	0	.01	0	0	.26	0	0	.06	0	.04	.17	.01
13	0	.01	0	0	0	.04	.01	.06	0	.02	0	.01
14	0	.07	0	.03	0	0	.01	.01	.12	.08	0	0
15	0	.01	0	0	0	0	.01	.21	.06	.09	0	0
16	.03	.01	0	0	.03	0	.01	.11	0	.02	.03	0
17	.01	.01	0	0	.01	0	0	0	0	.06	.13	0
18	0	.03	0	0	0	0	0	0	0	.05	.14	0
19	.03	.01	0	0	.01	0	0	0	0	.41	.02	.03
20	.02	.02	0	0	.01	.06	0	0	0	.23	0	0
21	.01	.02	0	0	.02	.01	0	0	0	.02	0	.14
22	.01	.02	0	0	.01	.01	0	0	0	0	0	.21
23	.01	.01	0	0	0	.01	0	0	0	0	0	.01
24	.01	.01	0	0	.01	.11	.03	0	0	.06	0	.06
25	.01	0	0	.03	0	0	.01	0	0	.01	0	0
26	.01	.02	0	.02	0	.02	0	0	0	.08	0	0
27	.01	.01	.03	.01	0	.01	0	0	0	.18	0	.01
28	0	0	.01	.01	.07	.01	.02	0	0	.08	0	0
29	.04	0	0	.15	.01	.06	0	0	0	.01	.05	.02
30	.01	0	0	0	.10	.03	0	0	0	0	0	0
31	.05	0	0	0	.01	0	0	0	0	0	0	0
Sum	1.16	0.41	0.05	0.31	0.79	0.49	0.34	0.45	0.23	2.44	0.57	0.77

Current Year 2001

Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum	
				Day	Day							
Jan.	0.470	0	5	0.77	1	0	0.04	100	183	1,127	0	
Feb.	.445	.005	14	.72	1	4	0	.01	35.4	162	493	7.4
Mar.	.375	0	27	.55	1	1	0	0	4.3	168	638	0
April	.560	0	29	1.01	1	1	0	.01	26.8	164	524	20.6
May	.785	0	12	1.68	1	1	0	.03	68.3	166	543	39.1
June	.360	0	24	.51	1	2	0	.02	42.3	148	734	19.0
July	.510	0	2	.87	1	1	0	.01	29.4	139	636	0
Aug.	.475	0	16	.79	1	1	0	.01	38.9	115	761	0
Sept.	.555	0	14	1.00	1	1	0	.01	19.9	126	570	0
Oct.	.700	0	8	1.40	1	1	0	.08	211	174	604	0
Nov.	.685	0	17	1.36	1	1	0	.02	49.2	182	570	11.1
Dec.	.520	0	21	.89	1	1	0	.02	66.5	200	730	16.9
Yearly	0.785	0		1.68		0	0.02	692	1,927	5,551	692	

1 And other days

## 09-5220.21 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, 1.8 kilometers downstream from the northerly international boundary, and about 12.1 kilometers 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 0.05 meter 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 2001.

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, 35.91 meters on February 18, 1998; minimum mean daily elevation above mean sea level, 30.94 meters on February 17, 1957.

## MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	33.030	31.990	32.710	32.020	31.680	31.450	31.540	31.630	31.420	31.490	31.580	31.860
2	32.920	32.000	32.320	32.020	31.660	31.450	31.780	31.630	31.430	31.540	31.660	31.870
3	32.960	31.940	31.930	32.020	31.660	31.460	31.660	31.500	31.520	31.490	31.710	31.930
4	32.900	31.940	31.860	32.020	31.630	31.470	31.600	31.560	31.540	31.470	31.720	31.970
5	32.840	31.970	31.890	32.020	31.570	31.450	31.600	31.590	31.530	31.470	31.710	31.970
6	32.850	31.950	31.840	32.060	31.560	31.460	31.620	31.760	31.520	31.450	31.750	31.970
7	32.850	31.960	31.810	32.030	31.570	31.450	31.690	31.690	31.530	31.380	31.740	31.960
8	32.760	31.950	31.850	32.030	31.600	31.450	31.650	31.570	31.550	31.300	31.730	31.960
9	32.310	31.960	32.140	32.080	31.510	31.470	31.770	31.670	31.460	31.370	31.730	31.970
10	31.880	31.960	31.990	32.070	31.520	31.470	31.840	31.530	31.470	31.450	31.730	31.980
11	32.030	31.990	31.990	32.040	31.530	31.480	31.850	31.550	31.460	31.580	31.800	31.970
12	32.030	32.010	31.900	32.020	31.520	31.500	31.720	31.650	31.580	31.510	31.830	31.970
13	32.110	32.070	31.900	32.020	31.510	31.510	31.690	31.620	31.620	31.410	31.740	31.980
14	32.060	32.150	31.950	32.080	31.460	31.480	31.670	31.610	31.670	31.360	31.810	31.990
15	31.880	32.020	32.020	32.210	31.390	31.490	31.620	31.600	31.720	31.380	31.760	31.980
16	31.850	32.020	32.060	32.240	31.350	31.500	31.590	31.380	31.490	31.400	31.790	31.960
17	31.880	32.010	32.060	32.060	31.300	31.510	31.570	31.450	31.610	31.440	31.780	31.960
18	31.960	32.000	32.110	32.020	31.300	31.560	31.590	31.630	31.560	31.510	31.770	31.970
19	32.090	32.070	32.110	32.030	31.360	31.550	31.610	31.500	31.470	31.500	31.790	31.950
20	31.910	32.130	32.080	32.030	31.380	31.550	31.560	31.560	31.470	31.530	31.740	31.940
21	31.900	32.130	32.080	32.030	31.530	31.550	31.530	31.480	31.520	31.680	31.800	31.960
22	31.940	32.170	32.070	32.090	31.550	31.530	31.560	31.570	31.520	31.730	31.810	31.950
23	31.920	32.150	32.060	32.030	31.540	31.530	31.570	31.490	31.530	31.630	31.830	31.990
24	31.930	32.130	32.070	31.980	31.390	31.540	31.600	31.400	31.760	31.770	31.860	32.140
25	31.920	32.060	32.070	31.900	31.380	31.520	31.720	31.370	31.660	31.720	31.890	31.960
26	31.950	32.280	32.170	31.870	31.330	31.510	31.730	31.360	31.730	31.630	31.850	31.950
27	32.010	32.530	32.130	31.860	31.360	31.550	31.470	31.420	31.690	31.590	31.910	31.860
28	31.980	32.820	32.150	31.870	31.550	31.580	31.470	31.440	31.510	31.570	31.890	31.850
29	31.950		32.070	31.850	31.470	31.580	31.640	31.440	31.440	31.710	31.800	31.870
30	31.960		32.060	31.850	31.450	31.550	31.580	31.500	31.470	31.570	31.900	31.870
31	31.980		32.090		31.410		31.600	31.440		31.470		31.910
Avg.	32.210	32.085	32.050	32.015	31.485	31.505	31.635	31.535	31.550	31.520	31.780	31.950

09-5220.30 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 61 meters downstream from the intake at Morelos Dam, 410 meters upstream from the point where it joins the old Alamo Canal, 3.5 kilometers upstream from Matamoros Check, and about 1.6 kilometers south of the northerly international boundary. The zero of the gage is 0.05 meter 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 2001. 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 Matamoros 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. Under conditions set forth in the 1944 Water Treaty, water for use in Mexico may be diverted to the Alamo Canal in the United States directly from the river at Rockwood Heading or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District. No diversions of this nature have been made during the years 1951 through 2001, and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Mexico occasionally pumps water from the Colorado River at other points below Morelos Dam when water is available in the channel.

EXTREMES: Maximum mean daily discharge, 187 CMS, July 12 and 14, 1983; maximum mean daily gage height, 32.96 meters October 30, 1993 and other days. Minimum daily discharge, no flow on various occasions.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	84.8	73.0	90.3	90.5	57.9	51.8	55.3	53.2	40.6	34.5	31.2	45.5
2	67.5	76.6	91.8	88.0	57.3	50.3	66.7	55.3	40.6	34.0	32.2	46.4
3	73.1	69.9	84.9	89.4	57.8	50.3	57.6	47.2	41.8	33.5	35.1	49.7
4	67.8	69.7	83.9	89.6	54.2	50.5	58.3	50.3	41.9	35.3	35.2	52.1
5	61.0	73.9	88.0	89.8	47.5	50.5	58.4	49.6	41.1	34.7	35.2	51.7
6	58.5	70.7	87.7	89.2	46.1	50.8	58.1	59.4	40.9	32.0	37.3	52.3
7	58.2	71.9	70.5	89.6	47.4	50.6	61.0	52.2	41.6	29.7	37.0	51.6
8	56.8	70.9	56.2	89.8	50.5	50.2	58.8	44.5	41.5	28.6	36.5	52.2
9	55.9	72.1	69.4	92.7	38.4	51.9	64.7	50.7	38.7	29.5	36.2	52.0
10	59.8	72.2	55.6	88.0	38.5	51.1	86.8	39.8	39.1	32.3	36.1	52.8
11	54.7	75.9	58.5	87.2	38.9	53.2	91.0	42.3	38.3	38.5	41.2	52.4
12	54.7	77.7	56.5	84.5	37.0	53.2	70.8	55.6	48.0	32.9	42.9	52.6
13	54.7	88.8	60.6	85.7	35.1	53.4	63.2	57.7	46.8	28.5	39.1	53.0
14	54.7	77.5	73.6	87.3	39.3	53.4	61.7	58.4	56.0	28.3	40.7	53.5
15	61.5	79.2	84.2	89.7	39.0	53.5	56.8	51.9	65.5	28.3	38.5	52.4
16	56.4	78.4	86.8	89.7	37.9	53.4	55.2	39.2	42.6	27.4	39.8	51.0
17	63.6	78.3	86.0	85.4	36.9	53.8	54.0	46.0	46.3	28.2	39.5	51.1
18	64.5	78.1	86.0	83.4	39.3	56.7	55.0	52.0	40.9	28.6	39.4	50.8
19	77.9	87.9	92.4	86.9	39.2	56.5	54.5	42.8	38.6	27.8	40.3	50.4
20	66.1	84.9	91.2	87.3	39.3	56.6	52.8	46.7	39.9	29.6	38.8	50.4
21	65.4	85.0	90.2	87.2	52.7	56.7	53.3	41.1	39.5	39.8	41.7	51.4
22	65.3	86.5	93.6	90.6	57.0	55.9	52.8	46.0	38.6	43.8	42.3	50.7
23	66.7	85.7	92.6	96.5	49.7	56.0	53.2	40.1	41.2	37.1	43.1	53.4
24	69.3	84.8	90.9	87.2	45.3	55.8	56.5	35.2	56.6	48.6	46.7	64.9
25	68.9	82.0	91.6	75.1	42.7	54.8	64.9	34.7	47.6	43.4	47.8	55.3
26	72.7	91.0	91.7	71.8	41.0	54.9	72.7	34.3	56.2	31.5	44.0	49.3
27	69.9	105	91.7	69.3	42.7	55.6	52.5	38.4	49.9	30.4	50.3	50.0
28	78.5	103	91.7	69.3	53.2	55.6	53.5	38.6	38.6	30.4	46.0	43.4
29	70.1		91.7	66.2	47.4	55.0	58.7	37.9	38.2	37.3	42.3	42.9
30	72.5		92.3	68.4	46.7	53.8	51.9	36.6	38.6	27.2	48.6	43.9
31	75.0		94.4		49.2		51.4	38.0		24.2		45.8
Sum	2,026.5	2,250.6	2,566.5	2,545.3	1,405.1	1,605.8	1,862.1	1,415.9	1,315.7	1,015.9	1,205.0	1,574.8

Current Year 2001

Period 1950-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	φ High		φ Low	Total		Average	Maximum	Minimum	
			Day	Day							
Jan.			1	84.8	11	54.7	65.4	175,090	118,528	275,305	1,192
Feb.			27	105	4	69.7	80.4	194,452	127,010	292,464	11,387
Mar.			31	94.4	10	55.6	82.8	221,746	237,003	435,370	120,761
April			23	96.5	29	66.2	84.8	219,914	253,952	404,698	189,700
May			1	57.9	13	35.1	45.3	121,401	148,026	286,174	81,665
June			18	56.7	8	50.2	53.5	138,741	195,743	332,588	117,400
July			11	91.0	31	51.4	60.1	160,885	258,837	439,171	145,135
Aug.			6	59.4	26	34.3	45.7	122,334	247,611	420,673	113,219
Sept.			15	65.5	29	38.2	43.9	113,676	155,557	336,960	66,156
Oct.			24	48.6	31	24.2	32.8	87,774	93,781	280,817	12,894
Nov.			27	50.3	1	31.2	40.2	104,112	87,038	258,889	9,271
Dec.			24	64.9	29	42.9	50.8	136,063	117,614	247,399	10,886
Yearly				105		24.2	57.0	1,796,188	2,043,727	3,451,533	1,569,404

φ Mean daily

! And other days

## 09-5220.31 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.450	31.540	31.630	31.610	31.370	31.250	31.340	31.430	31.220	31.290	31.380	31.660
2	31.400	31.580	31.640	31.620	31.300	31.250	31.510	31.430	31.230	31.340	31.460	31.670
3	31.360	31.500	31.620	31.630	31.300	31.270	31.400	31.300	31.320	31.290	31.510	31.730
4	31.370	31.510	31.640	31.620	31.270	31.270	31.390	31.360	31.340	31.270	31.520	31.770
5	31.350	31.570	31.660	31.600	31.240	31.250	31.380	31.390	31.330	31.270	31.510	31.770
6	31.370	31.540	31.630	31.600	31.200	31.310	31.380	31.590	31.320	31.250	31.550	31.770
7	31.380	31.560	31.380	31.600	31.260	31.250	31.450	31.490	31.330	31.180	31.540	31.760
8	31.380	31.530	31.270	31.650	31.320	31.250	31.430	31.370	31.350	31.100	31.530	31.760
9	31.370	31.530	31.400	31.670	31.130	31.270	31.570	31.470	31.260	31.170	31.530	31.770
10	31.420	31.530	31.290	31.590	31.150	31.260	31.640	31.330	31.270	31.250	31.530	31.780
11	31.550	31.550	31.300	31.550	31.190	31.280	31.650	31.340	31.260	31.380	31.600	31.770
12	31.590	31.570	31.320	31.540	31.180	31.300	31.520	31.450	31.380	31.310	31.630	31.760
13	31.610	31.670	31.380	31.570	31.180	31.300	31.490	31.420	31.420	31.210	31.540	31.780
14	31.620	31.750	31.500	31.660	31.180	31.280	31.470	31.410	31.470	31.160	31.610	31.790
15	31.450	31.610	31.600	31.840	31.190	31.290	31.410	31.400	31.520	31.180	31.560	31.780
16	31.400	31.590	31.650	31.810	31.140	31.290	31.390	31.180	31.290	31.200	31.590	31.760
17	31.470	31.580	31.640	31.660	31.090	31.310	31.370	31.250	31.410	31.230	31.580	31.760
18	31.510	31.560	31.690	31.610	31.100	31.350	31.390	31.430	31.360	31.310	31.580	31.770
19	31.550	31.660	31.670	31.600	31.170	31.350	31.410	31.300	31.270	31.300	31.600	31.750
20	31.500	31.740	31.710	31.610	31.180	31.350	31.360	31.360	31.270	31.330	31.540	31.740
21	31.480	31.730	31.700	31.630	31.320	31.350	31.330	31.280	31.320	31.480	31.600	31.760
22	31.490	31.770	31.700	31.720	31.340	31.330	31.360	31.370	31.320	31.530	31.610	31.750
23	31.490	31.750	31.660	31.740	31.250	31.330	31.370	31.290	31.330	31.430	31.620	31.790
24	31.540	31.730	31.630	31.690	31.190	31.340	31.400	31.200	31.560	31.570	31.660	31.940
25	31.540	31.630	31.630	31.550	31.170	31.320	31.520	31.170	31.460	31.520	31.690	31.790
26	31.560	31.760	31.720	31.520	31.130	31.310	31.520	31.160	31.530	31.430	31.650	31.760
27	31.600	31.780	31.750	31.470	31.170	31.350	31.270	31.220	31.310	31.390	31.710	31.750
28	31.560	31.730	31.790	31.490	31.350	31.380	31.270	31.240	31.310	31.370	31.690	31.660
29	31.500		31.680	31.480	31.270	31.380	31.440	31.240	31.240	31.510	31.600	31.650
30	31.520		31.650	31.520	31.240	31.370	31.380	31.300	31.270	31.360	31.700	31.670
31	31.530		31.690	31.210	31.210	31.210	31.400	31.240	31.240	31.270	31.710	31.710
Avg.	31.480	31.625	31.590	31.615	31.220	31.305	31.425	31.335	31.340	31.320	31.580	31.755

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 09-5220.41 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, 1.8 kilometers downstream from the northerly international boundary, and about 12.1 kilometers 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 0.05 meter 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 2001.

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 staff gage.

EXTREMES: Maximum mean daily gage height, 35.87 meters on February 15, 1998; minimum mean gage height, 29.06 meters from October 3, 1996 to January 13, 1997.

MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	30.500	30.500	32.590	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
2	30.500	30.500	32.220	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
3	30.500	30.500	30.950	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.350	30.500
4	30.500	30.500	30.570	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
5	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
6	30.500	30.500	30.550	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
7	30.500	30.500	30.810	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
8	30.500	30.500	30.850	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
9	30.500	30.500	31.140	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
10	30.500	30.500	30.990	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
11	30.500	30.500	30.990	30.500	30.500	30.500	30.640	30.500	30.500	30.500	30.500	30.500
12	30.500	30.500	30.900	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
13	30.500	30.500	30.900	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
14	30.500	30.500	30.970	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
15	30.500	30.500	30.620	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
16	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
17	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
18	30.550	30.500	30.510	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
19	30.600	30.500	30.520	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
20	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
21	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
22	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
23	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
24	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
25	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
26	30.500	30.500	30.670	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
27	30.500	30.500	30.510	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
28	30.500	32.720	30.510	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
29	30.500		30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
30	30.500		30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
31	30.500		30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
Avg.	30.505	30.580	30.765	30.500	30.500	30.500	30.505	30.500	30.500	30.500	30.495	30.500

09-5319.00 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, 1.8 kilometers downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.

RECORDS: Based on 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 2001.

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 19.3 kilometers, and placed in operation on November 16, 1965. Drainage flows may be discharged on an emergency basis 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, 3.1 kilometers upstream from Morelos Dam; and directly to the Colorado River immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. On July 14, 1972, Minute No. 241 of the Commission became effective. The Minute called for discharge of all Wellton-Mohawk drainage waters to be made below Morelos Dam. On August 30, 1973, Minute No. 242 of the Commission became effective. The Minute called for construction of a concrete-lined bypass drain from Morelos Dam to the Santa Clara Slough in Mexico. On June 23, 1977, the first flow was recorded in the bypass drain. Drainage flows through Main Outlet Extension No. 3 will be only on an emergency basis.

## MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	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	0	0	0	0	0	0	0	0	0	0
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	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	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	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	0	0	0	0	0	0	0
30	0	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	0	0	0	0	0	0	0	0	0	0	0	0

Current Year 2001

Period 1966-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0	0	! 1	0	! 1	0	0	6,734	23,088	0	
Feb.	0	0	! 1	0	! 1	0	0	5,177	20,959	0	
Mar.	0	0	! 1	0	! 1	0	0	3,653	22,827	0	
April	0	0	! 1	0	! 1	0	0	3,272	22,944	0	
May	0	0	! 1	0	! 1	0	0	4,932	23,548	0	
June	0	0	! 1	0	! 1	0	0	3,882	23,135	0	
July	0	0	! 1	0	! 1	0	0	3,564	23,370	0	
Aug.	0	0	! 1	0	! 1	0	0	3,624	23,668	0	
Sept.	0	0	! 1	0	! 1	0	0	5,093	22,787	0	
Oct.	0	0	! 1	0	! 1	0	0	7,168	23,683	0	
Nov.	0	0	! 1	0	! 1	0	0	6,796	22,792	0	
Dec.	0	0	! 1	0	! 1	0	0	6,250	23,585	0	
Yearly	0	0		0		0	0	60,145	264,928	0	

! And other days

## 09-5325.00 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, 6.9 kilometers downstream from the northerly international boundary and 5.1 kilometers downstream from Morelos Diversion Dam. It is the largest of 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. Since June 1986, zero of the gage is 34.05 meters above mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was mean sea level, U. S. C. & G. S. datum.

**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 2001, obtained by the United States Section; monthly discharge, January 1924 through 1950 by Bureau of Reclamation.

**EXTREMES:** Prior to January 1951, maximum monthly discharge, 12,014 TCM in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 22.7 CMS on December 3, 1961, at a maximum gage height of 35.845 meters; minimum instantaneous discharge, zero during parts of most years.

## MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.39	0.65	0.61	1.70	0.25	0.36	1.07	0.08	0.02	0.89	0.52	0.21
2	.43	.62	1.01	.61	.02	.69	.29	.24	.06	.84	.90	.97
3	.16	.47	.74	.32	.03	.21	.04	.81	1.00	.80	.99	.01
4	.40	.51	.06	.11	.02	.34	.04	.11	.39	.58	1.87	.01
5	.76	.06	.04	.55	.02	.51	.04	.02	.04	.98	1.26	.01
6	.29	.12	.03	.02	.86	.14	.41	.01	.10	1.59	1.13	.02
7	1.74	.03	.04	.02	.68	.23	1.19	.01	.04	1.20	1.00	.48
8	1.69	.33	.03	.38	.01	.60	.93	0	.52	.95	.69	1.39
9	1.11	.11	.03	.17	.01	.14	.27	.01	.91	.47	.84	.86
10	.63	.39	.04	.03	.01	.60	.04	.20	.67	.01	.76	1.52
11	.46	.69	.03	.06	.01	.29	.09	.75	.11	.51	1.38	1.22
12	1.19	.84	.04	.05	.01	.09	.67	1.16	.15	.01	.68	.84
13	.48	.29	.15	.54	.16	.36	.28	1.57	.03	.21	1.76	.93
14	1.17	.18	.21	.04	.62	.08	.25	.39	.07	.83	2.06	1.21
15	.60	.03	.07	.21	.22	.66	.04	.11	.49	1.17	1.92	1.62
16	.21	.37	.11	1.23	.02	.72	.04	.48	.03	.95	1.26	1.07
17	.42	.42	.18	1.48	.10	1.30	.02	.03	.20	.63	1.46	.41
18	.68	1.10	.11	.58	.01	.68	.27	.01	.03	.32	2.83	.56
19	.02	.42	.02	.06	.14	.08	.84	.34	.86	.69	1.39	1.00
20	.05	.19	.40	.08	.99	.49	.29	.61	1.32	.29	.55	1.72
21	.92	.12	.21	.07	.20	.13	.82	.31	.96	.75	.09	1.15
22	.83	.04	.03	.02	.28	.18	.65	.37	.01	.49	1.16	1.33
23	.07	.20	.11	.08	.28	.63	.98	.18	.74	.53	.58	.63
24	.21	1.01	1.26	.02	.82	.70	.03	.40	.39	1.15	.06	.85
25	.29	1.33	.91	.30	.76	1.19	.25	.96	.78	.71	1.61	1.13
26	.06	.98	.91	.21	.34	.45	.18	1.31	.60	1.34	1.14	.78
27	.13	.50	1.27	.02	1.54	.62	.12	.92	.51	.75	.99	.33
28	.64	.38	.45	.08	1.38	.48	.01	.53	.58	1.19	.04	1.10
29	.15	.94	.49	.63	.54	.13	.18	.02	1.08	.48	.88	.88
30	.09	.58	.69	.10	.28	.61	.51	.04	.63	.13	.95	.95
31	.11	1.51		.13		.44	.09		1.05		.91	
Sum	17.38	12.38	12.13	10.22	10.65	13.77	11.33	12.70	12.57	23.59	31.53	26.10

## Current Year 2001

## Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum	
				Day	Low							
Jan.	0.690	0.015	12	3.10	1	0.01	0.56	1,502	2,552	11,804	0	
Feb.	.500	.015	17	2.15	1	.01	.44	1,070	2,086	10,398	17.9	
Mar.	.585	0	31	2.39	1	18	0	.39	1,048	1,967	7,685	51.8
April	.590	.015	5	2.45	1	5	.01	.34	883	1,806	7,771	0
May	.650	0	26	2.85	1	11	0	.34	920	2,133	11,496	10.2
June	.585	.020	17	2.40	1	1	.02	.46	1,190	2,031	9,177	13.0
July	.550	.010	22	2.24	1	18	.01	.37	979	2,055	10,263	11.2
Aug.	.630	.005	11	2.70	1	8	0	.41	1,097	1,785	12,014	18.1
Sept.	.815	.020	8	4.06	30	.01	.42	1,086	1,312	7,574	7.4	
Oct.	.790	0	28	3.83	1	7	0	.76	2,038	1,819	7,006	14.7
Nov.	.740	.010	4	3.47	1	1	.01	1.05	2,724	2,204	10,139	23.2
Dec.	.955	.010	28	5.21	1	3	.01	.84	2,255	2,814	11,632	51.8
Yearly	0.955	0		5.21		0	0.53	16,792	24,564	102,255	707	

! And other days

## 09-5221.00 COLORADO RIVER AT ELEVEN MILE GAGE - STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 6.9 kilometers downstream from northerly international boundary, 5.1 kilometers downstream from Morelos Dam, about 15 meters downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 17.7 kilometers downstream from Yuma, Arizona, along the river levee. The zero of the gage is at mean sea level, U. S. C. & G. S. datum. On April 1, 1988, the gage was relocated 399 meters downstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is 0.12 meter lower than the old gage. On August 1, 1993, the gage was relocated 81.0 meters upstream of the original 1947 gage. The datum is equal to the 1947 gage.

RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 2001; 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, 33.840 meters on February 18, 1998; minimum mean daily gage height, 27.630 meters on April 7, 1999.

## MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	28.880	27.775	30.635	27.795	27.680	27.650	27.725	27.685	27.730	27.855	27.890	27.915
2	28.470	27.770	29.625	27.745	27.660	27.665	27.650	27.705	27.740	27.870	27.965	27.990
3	28.575	27.765	29.330	27.735	27.655	27.625	27.630	27.755	27.840	27.855	27.970	27.895
4	28.470	27.755	28.750	27.710	27.655	27.630	27.620	27.700	27.795	27.830	28.065	27.895
5	28.200	27.725	28.380	27.755	27.655	27.650	27.640	27.695	27.760	27.865	28.010	27.895
6	28.100	27.725	28.280	27.700	27.730	27.630	27.700	27.690	27.770	27.955	27.980	27.900
7	28.140	27.715	29.490	27.695	27.720	27.635	27.820	27.695	27.755	27.900	27.960	27.955
8	28.050	27.740	29.970	27.720	27.640	27.665	27.880	27.700	27.815	27.890	27.930	28.085
9	28.070	27.720	29.755	27.710	27.635	27.625	27.885	27.695	27.825	27.815	27.955	28.015
10	27.835	27.745	29.280	27.680	27.625	27.660	28.850	27.720	27.820	27.770	27.935	28.070
11	28.335	27.760	29.705	27.680	27.625	27.645	27.970	27.875	27.755	27.835	28.040	28.075
12	27.910	27.865	29.960	27.675	27.625	27.625	27.755	28.095	27.770	27.785	27.955	28.005
13	28.495	27.725	29.215	27.715	27.680	27.650	27.705	27.830	27.755	27.820	28.055	28.010
14	28.150	27.715	28.675	27.675	27.685	27.630	27.900	27.730	27.760	27.885	28.125	28.050
15	27.825	27.700	28.205	27.890	27.660	27.670	27.690	27.695	27.820	27.935	28.050	28.095
16	27.785	27.725	27.825	28.305	27.630	27.685	27.665	27.735	27.770	27.920	28.010	28.040
17	27.900	27.735	27.820	27.795	27.635	27.745	27.645	27.685	27.790	27.850	28.020	27.960
18	27.945	27.785	27.845	27.715	27.630	27.695	27.660	27.685	27.775	27.825	28.210	27.975
19	28.615	27.730	28.335	27.670	27.640	27.645	27.690	27.725	27.860	27.875	28.080	28.010
20	27.765	27.750	27.800	27.675	27.725	27.680	27.665	27.760	27.890	27.835	27.955	28.105
21	27.805	27.870	27.765	27.670	27.650	27.650	27.685	27.740	27.870	27.880	27.900	28.050
22	27.800	27.995	27.740	27.790	27.665	27.660	27.705	27.750	27.860	27.870	27.985	28.050
23	27.750	28.135	27.740	27.990	27.660	27.705	27.720	27.735	27.840	27.875	27.955	27.980
24	27.765	28.320	27.800	27.690	27.715	27.705	27.660	27.745	28.045	27.970	27.885	28.205
25	27.770	28.465	27.870	27.700	27.690	27.755	27.700	27.800	27.940	27.910	28.050	28.330
26	27.750	29.290	28.230	27.685	27.640	27.705	27.690	27.825	27.840	27.995	28.025	28.140
27	28.190	30.870	27.815	27.665	27.765	27.745	27.670	27.800	27.830	27.915	27.995	27.885
28	27.800	30.725	27.870	27.670	27.740	27.740	27.660	27.775	27.835	27.960	27.885	27.950
29	27.755		27.790	27.710	27.685	27.690	27.680	27.735	27.775	27.965	27.930	27.915
30	27.745		27.760	27.715	27.635	27.705	27.740	27.780	27.770	27.895	27.900	27.915
31	27.740		27.815	27.630	27.630	27.705	27.725	27.740	27.740	27.940	27.920	27.920
Avg.	28.040	28.095	28.550	27.745	27.665	27.670	27.745	27.750	27.815	27.880	27.990	28.010

09-5330.00 TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway from West Main Canal to Colorado River. Located on east side of levee at site used prior to May 1, 1971. The site used May 1, 1971 to September 20, 1977 was located 61 meters downstream from present site on west side of levee. This wasteway is located in Arizona, 29.8 kilometers downstream from the northerly international boundary, 28.0 kilometers downstream from Morelos Diversion Dam, and 3.5 kilometers upstream from the southerly international boundary. It is the farthest downstream of the two wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limnrophe section of the Colorado River. The elevation of the zero of the gage at the new location has not been determined.

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 2001, 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. The West Main Canal Wasteway was completed in February of 1971, and the waste water from the West Main Canal is normally discharged across the southerly land boundary.

EXTREMES: Prior to January 1951, maximum monthly discharge 3,528 TCM in January 1946; minimum monthly discharge, 150 TCM in September 1950. Since January 1, 1951, maximum instantaneous discharge, 2.89 CMS on January 24, 1954, at a maximum gage height of 29.095 meters (old datum); minimum instantaneous discharge, zero during a part of most months.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.24	0	0	0	0	0	0	0	0	0.24	0.18	0.33
2	0	0	0	0	0	0	0	0	0	.32	.55	1.06
3	.01	0	0	.02	0	0	0	0	0	.07	.22	.29
4	.29	0	0	.02	0	0	0	0	0	.10	.20	.03
5	.38	0	0	.02	0	0	0	0	0	.26	.64	.19
6	.04	0	0	.01	.24	0	0	0	0	.27	.20	.12
7	.05	0	0	.02	.10	0	0	0	0	.44	.32	.50
8	0	0	0	.01	0	0	0	0	0	.23	.48	.46
9	0	0	0	.01	0	0	0	0	0	.31	.59	.39
10	0	0	0	0	0	0	0	0	0	.11	.75	.34
11	0	0	0	0	0	0	0	0	0	.39	.64	.04
12	0	0	0	0	0	0	0	0	0	.29	.65	.31
13	0	0	0	0	0	0	0	0	0	.37	.49	.48
14	0	0	0	0	0	0	0	0	0	.25	.52	.44
15	0	0	.31	0	0	0	0	0	0	.53	.39	.25
16	0	0	.11	0	0	0	0	0	0	.47	.27	.36
17	0	0	.08	0	0	0	0	0	.12	.70	.14	.33
18	0	0	.01	0	0	0	0	0	.17	.45	.58	.25
19	0	0	.11	0	0	0	0	0	.06	.17	.19	.30
20	0	0	0	0	0	0	0	0	0	.02	.14	.06
21	0	0	0	0	0	0	0	0	0	.47	.30	.07
22	0	0	0	0	0	.17	0	0	0	.32	.45	.30
23	0	0	.12	0	0	.10	0	0	.10	.44	.35	.57
24	0	0	.01	0	.54	.09	0	0	.02	.35	.31	.56
25	0	0	.01	0	.32	.06	0	0	0	.29	.46	.45
26	0	0	.01	0	.09	.11	0	0	0	.46	.37	.14
27	0	0	.01	0	.14	.06	0	0	0	.38	.25	.44
28	0	0	.01	0	.13	.02	0	0	0	.23	.12	.45
29	0	0	.12	0	.14	0	0	0	0	.27	.38	.27
30	0	0	.12	0	.08	0	.04	0	0	.18	.26	.21
31	0	0	.02	0	0	0	0	0	0	.42	.47	.47
Sum	1.01	0	1.24	0.11	1.78	0.61	0.04	0	0.52	9.82	11.50	10.35

Current Year 2001

Period 1939-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum
				Day	Day						
Jan.	0.490	0	5	0.98	12	0	0.03	87.3	621	3,528	0
Feb.	0	0	1	0	11	0	0	0	524	3,096	0
Mar.	.415	0	23	.74	11	0	.04	107	479	2,048	0
April	.085	0	3	.06	11	0	0	9.5	512	2,393	0
May	.575	0	24	1.27	11	0	.06	154	625	3,047	0
June	.325	0	22	.50	11	0	.02	52.7	545	2,899	0
July	.165	0	30	.16	11	0	0	3.5	471	2,405	0
Aug.	0	0	1	0	11	0	0	0	493	3,121	0
Sept.	.495	0	17	.99	11	0	.02	44.9	447	2,689	0
Oct.	.690	0	15	1.70	11	0	.32	848	589	2,590	0
Nov.	.600	.010	10	1.36	21	0	.38	994	717	2,936	0
Dec.	.575	.020	8	1.26	11	.01	.33	894	735	3,306	0
Yearly	0.690	0		1.70		0	0.10	3,195	6,758	30,060	0

! And other days

09-5345.00 EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 91 meters north of the international boundary near San Luis, Arizona and 2.4 kilometers east of the Colorado River. From September 28, 1977 to April 6, 1978, recorder was moved west 31 meters to a temporary bypass channel. On April 7, 1978, recorder was moved back to original site. On August 17, 1992, flow ceased through the wasteway due to construction upstream of the gage. The gage was relocated 20 meters west of the original site providing continuous record since December 21, 1992.

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 2001. 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 land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.13	0.14	0.05	0.34	0.18	0.04	0.08	0.46	0	0.15	0.34	0.52
2	.11	.06	.04	.01	.10	.03	.17	.20	0	.10	.22	.46
3	0	.06	.18	.07	.09	.52	.16	0	0	0	.08	.12
4	.29	0	0	.17	.02	.11	.10	.11	.26	.01	.31	.47
5	.39	0	0	.09	0	.40	0	.22	.14	.23	.06	.25
6	.27	0	.05	.02	.04	.26	0	.22	.14	.31	.09	.21
7	.46	.09	.33	.01	.15	.27	.18	.19	.03	.32	.16	.52
8	.26	.01	.38	.15	.16	.46	0	.07	.12	.12	.09	.09
9	.27	0	.23	.03	.08	.27	.17	.04	.15	.38	.34	0
10	.26	0	.17	.11	.07	.08	.42	.07	.43	.05	.09	0
11	.09	0	.14	.03	.11	.03	.21	.36	.29	0	.27	.09
12	.27	0	.09	.03	.11	.03	.13	.23	.34	.02	.01	.08
13	.15	.17	.30	.06	.01	.06	.22	.30	.20	.16	.27	.05
14	.06	.21	.13	.03	.10	0	.38	.42	.22	.13	.14	.15
15	.03	.54	.11	0	.10	0	.37	.36	.01	.10	.15	.14
16	.19	.27	.18	.14	.08	0	.16	.31	.04	.04	.29	.51
17	.10	.11	.26	.13	0	.30	.04	.02	.18	.06	.02	.34
18	.07	.06	.02	.13	.08	.21	.36	.01	.05	.01	.24	.27
19	.15	.01	.11	.08	.02	.30	.38	0	.05	.02	.07	.14
20	.29	.31	.42	.08	0	.30	.30	0	.03	.06	.35	.19
21	.06	.19	.13	.02	0	.13	.23	.05	.02	.17	.31	.07
22	.44	.33	.12	0	.01	.03	.08	.06	.10	.39	.02	.16
23	.13	.44	.33	0	0	.12	.13	.10	.17	.06	.11	.08
24	.11	.21	.07	.24	.12	.06	.13	.15	.14	.18	.02	.48
25	.16	.05	.07	.08	.13	0	.19	.18	.20	.18	.28	.31
26	.42	.05	.03	.32	.16	.06	.05	.34	.18	0	.06	.18
27	.35	0	.17	.23	0	.15	.11	.20	.29	.11	.13	.08
28	.12	0	.19	.09	0	0	.07	.11	.09	.17	.27	.11
29	.06	0	0	.16	.09	.18	.36	.21	.21	.09	.25	.02
30	0	0	.04	.27	.14	.07	.06	.33	.02	.24	.50	.01
31	.11	0	.03	.03	.13	.09	.09	.08	.08	.37	0	0
Sum	5.80	3.31	4.37	3.12	2.18	4.47	5.33	5.40	4.10	4.21	5.54	6.08

Current Year 2001

Period 1955-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
												High
Jan.	0.295	0	7	0.72	1	1	0	0.19	501	1,110	4,144	111
Feb.	.330	0	19	.84	1	2	0	.12	286	924	3,910	164
Mar.	.260	0	20	.61	1	1	0	.14	378	1,055	3,602	175
April	.255	0	1	.58	1	2	0	.10	270	1,021	3,910	165
May	.195	0	26	.41	1	1	0	.07	188	1,147	3,750	188
June	.280	0	3	.67	1	1	0	.15	386	953	4,515	157
July	.250	0	18	.57	1	1	0	.17	461	1,029	4,428	210
Aug.	.285	0	1	.68	1	3	0	.17	467	1,062	4,885	196
Sept.	.255	0	27	.59	1	1	0	.14	354	995	3,910	0
Oct.	.255	0	122	.59	1	2	0	.14	364	1,050	4,046	0
Nov.	.290	0	30	.70	1	3	0	.18	479	1,139	4,404	0
Dec.	.285	0	1	.68	1	8	0	.20	525	1,120	3,799	51.0
Yearly	0.330	0		0.84			0	0.15	4,659	12,605	47,255	3,733

! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5340.00 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 61 meters north of the international boundary near San Luis, Arizona, 2.1 kilometers east of the Colorado River.

RECORDS: Main Drain discharges are lifted 3.05 to 3.66 meters 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. 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 2001.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. The Main Drain, the East Main Canal Wasteway, West Main Canal Wasteway, and 242 Lateral 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 land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.43	3.75	3.75	3.89	3.94	4.14	3.99	3.09	3.28	4.63	5.36	5.35
2	4.19	3.66	3.40	4.51	4.02	3.69	4.26	3.31	3.50	4.57	5.16	5.78
3	4.14	3.72	3.37	3.61	3.78	4.09	3.48	3.00	3.63	4.09	5.55	4.79
4	4.98	4.18	3.82	3.36	3.87	3.82	3.74	3.15	3.40	3.84	5.88	4.04
5	4.13	3.83	3.49	3.55	4.19	3.74	4.07	3.51	3.20	4.84	6.44	3.87
6	4.45	3.91	3.08	3.81	4.45	3.57	4.44	2.84	2.98	4.81	5.65	3.85
7	4.39	3.89	4.20	3.67	4.30	3.84	4.11	2.52	3.91	5.33	6.11	4.81
8	4.03	4.01	5.44	4.10	3.76	3.71	4.32	2.30	3.66	5.43	5.93	4.63
9	3.97	3.98	3.47	4.26	3.73	3.79	3.82	2.10	4.39	4.27	4.89	4.70
10	4.08	4.31	2.88	3.77	3.95	3.71	3.71	2.93	3.92	5.11	4.50	4.66
11	3.22	4.32	3.14	4.12	4.67	3.77	3.91	2.59	3.86	4.92	5.44	3.79
12	3.76	4.03	3.23	3.99	4.18	3.36	4.31	2.68	4.06	4.93	5.41	3.84
13	3.61	3.66	3.79	3.75	4.71	4.00	4.01	2.85	3.51	4.54	5.73	3.93
14	3.57	3.85	3.82	4.27	4.52	3.34	3.52	2.56	3.41	5.13	4.91	4.76
15	3.62	3.74	3.03	4.18	4.09	3.67	3.54	2.60	3.19	5.72	5.22	5.50
16	3.82	3.42	2.81	3.35	4.22	3.65	3.03	2.43	2.93	4.67	4.83	4.84
17	4.18	3.83	3.50	3.69	4.14	4.10	3.08	3.20	4.18	5.21	4.79	5.31
18	3.90	4.85	3.32	3.32	4.25	3.63	3.73	3.17	4.33	4.47	5.25	4.56
19	3.81	3.98	3.16	3.81	4.93	3.19	3.30	3.32	3.94	5.73	5.31	4.98
20	3.60	3.50	3.27	4.00	5.33	3.78	3.02	3.39	3.76	5.98	4.88	4.90
21	3.31	4.10	3.51	4.29	5.62	3.53	3.37	3.00	4.59	6.07	5.59	4.80
22	3.65	4.03	3.47	4.61	4.92	3.12	4.50	3.03	4.19	6.06	5.72	4.27
23	3.42	4.13	3.16	4.37	4.28	3.09	3.80	2.96	4.01	5.45	4.97	4.29
24	3.36	4.84	3.64	3.91	4.09	3.68	3.88	3.37	4.57	5.76	4.62	4.28
25	3.79	4.16	4.09	3.68	4.56	3.22	4.05	3.44	4.08	5.73	4.47	4.39
26	3.42	4.33	3.71	4.08	4.64	3.42	3.38	2.86	4.42	5.86	5.19	3.75
27	3.86	4.10	4.07	3.91	4.72	3.37	2.93	2.84	4.16	4.76	5.22	3.85
28	3.48	4.57	3.45	4.10	3.59	3.25	3.61	2.77	4.91	6.05	5.23	4.26
29	3.69	3.88	3.84	3.64	3.58	3.32	3.22	2.64	5.09	5.30	5.16	4.65
30	3.60	3.74	3.74	4.04	3.63	3.30	3.60	3.57	4.58	4.55	5.35	4.66
31	3.88	3.74	3.74	3.70	3.70	3.51	3.51	3.58	5.29	5.29	4.43	4.43
Sum	119.34	112.68	110.43	117.84	132.42	108.15	115.34	91.60	117.64	159.10	158.76	140.52

Current Year 2001

Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.			11	8.18	11	0	3.85	10,311	9,404	13,819	2,146
Feb.			26	6.25	25	0	4.02	9,736	9,030	14,787	2,023
Mar.			8	6.57	23	1.30	3.56	9,541	10,298	15,352	2,393
April			2	6.12	6	1.61	3.93	10,181	10,263	14,666	2,368
May			5	6.05	12	1.58	4.27	11,441	10,596	16,208	2,405
June			18	6.73	112	0	3.61	9,344	9,696	14,851	2,825
July			6	6.29	20	1.25	3.72	9,965	9,600	14,715	3,121
Aug.			15	6.20	19	0	2.95	7,914	9,531	14,752	3,158
Sept.			18	6.46	14	0	3.92	10,164	9,698	14,269	2,812
Oct.			7	6.69	18	0	5.13	13,746	11,331	15,277	3,626
Nov.			4	6.73	14	0	5.29	13,717	10,887	14,814	3,454
Dec.			18	6.51	18	0	4.53	12,141	10,208	14,160	3,022
Yearly				8.18		0	4.07	128,201	120,542	171,922	33,353

! And other days

09-5343.00 WEST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder located about 0.5 kilometer upstream from outlet to Yuma Main Drain, which is 53 meters upstream from East Main Canal Wasteway outlet and 0.6 kilometer west of San Luis, Arizona. Prior to August 1, 1975, the recorder was located about 46 meters upstream from outlet to Yuma Main Drain.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning February 23, 1971, from water-stage recorder and ratings as determined by current meter measurements. Records available: February 23, 1971 through 2001.

REMARKS: Wasteway discharges from West Main Canal Wasteway comprise regulatory waste from the West Main Canal and this water is considered as part of the volumes arriving at the land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1		0.68	0.49	0.67	0.39	0.29	0.53	0.48	0.48	0.32	0.43	0	0.01
2		.19	.10	.40	.51	.43	.41	.29	.38	.29	.09	0	0
3		.03	.07	.25	.43	.31	.27	.01	.74	.71	.11	0	0
4		.14	.01	.13	.12	.27	.61	.23	.46	.08	.16	0	0
5		.11	.58	.35	.64	.31	.88	.68	.96	.40	.16	0	0
6		.05	.45	.31	.19	.72	.81	.33	.15	.39	.21	.01	0
7		.34	.04	.12	.42	.58	.30	.63	.12	.33	.18	0	.01
8		.13	.36	.24	.92	.04	.43	.40	.02	.02	.18	0	.03
9		.36	.33	.17	.29	.11	.17	.67	.03	.48	.21	.01	.01
10		.17	.48	.04	.38	.31	.37	.74	.30	.21	.20	.01	.01
11		.37	.23	.02	.61	.16	.17	.04	.24	.07	.05	.01	0
12		.69	.50	.06	.43	.04	.65	.31	.01	.24	.09	0	.02
13		.36	.28	.34	.41	.53	.50	.42	.41	.24	.06	0	.02
14		.02	.22	.82	.49	.43	.74	.31	.11	.48	.33	0	0
15		.57	.30	.29	.47	.53	.39	.27	.10	.46	.33	0	0
16		.23	.53	.06	.72	.25	.40	.27	.33	.31	.05	0	0
17		.01	.59	.03	.61	.95	.18	.31	.33	.11	.02	0	.02
18		.41	.71	.09	.39	.43	.04	.46	.91	.24	0	0	0
19		.41	.38	.24	.15	.14	.29	.15	1.06	.60	.02	0	0
20		.31	.73	.39	.33	.60	.08	.26	.92	.75	.03	.01	0
21		.83	.52	.40	.46	.66	.19	.14	.82	.58	.04	.01	.01
22		.39	.50	.43	.55	.31	.11	.46	.48	.18	.06	0	.01
23	0	.24	.41	.28	.30	.51	.21	.28	.74	.02	0	0	.02
24		.31	.84	.51	.28	.40	.35	.03	.44	.65	0	.02	0
25		.72	.62	.54	.27	.32	.30	.24	.49	.22	0	.07	0
26		.61	.70	.88	.54	.06	.23	.33	.54	.64	0	0	.02
27		.15	1.14	.84	.70	.23	.32	.68	.49	.22	0	0	0
28		.06	.99	.47	.71	.13	.39	.49	.05	.17	0	.01	0
29		.68		1.02	.26	.18	.33	.57	.17	.30	0	.01	0
30		.06		.48	.14	.20	.06	.35	.41	.04	.01	.05	.01
31		.18		.18		.08		.31	.48		0		0
Sum	9.57	12.93	11.18	13.09	9.70	11.36	10.85	12.71	10.47	3.04	0.22	0.22	

Current Year 2001

Period 1971-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High		Day		Total	Average	Maximum	Minimum
				Day	Low						
Jan.	0.780	0.020	121	1.20	117	0	0.31	827	609	1,376	48.7
Feb.	.830	.020	17	1.38	13	0	.46	1,117	563	1,117	196
Mar.	.830	.030	29	1.38	16	0	.36	966	598	1,158	250
April	.790	.090	8	1.24	30	.01	.44	1,131	581	1,280	202
May	.790	.005	6	1.23	18	0	.31	838	516	1,445	183
June	.745	.010	14	1.08	111	0	.38	982	478	1,067	55.8
July	.725	.005	5	1.02	13	0	.35	937	482	944	77.3
Aug.	.805	.010	5	1.29	117	0	.41	1,098	563	1,447	121
Sept.	.845	.005	26	1.43	14	0	.35	905	556	1,128	234
Oct.	.750	0	1	1.10	11	0	.10	263	528	1,135	164
Nov.	.450	0	24	.15	1	0	.01	19.0	436	845	19.0
Dec.	.450	0	8	.15	1	0	.01	19.0	522	1,204	19.0
Yearly	0.845	0		1.43		0	0.29	9,102	6,432	10,047	3,179

! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5345.50 242 WELL FIELD NEAR SAN LUIS, ARIZONA

DESCRIPTION: Water-stage recorder and 3.7 meter Parshall flume located 31 meters upstream from confluence of East Main Canal Wasteway, 34 meters north of the southerly land boundary, and 2.3 kilometers east of the Colorado River.  
 RECORDS: Based on current meter measurements and a continuous record of gage heights. The station is operated by the United States Section of the Commission. Records available: October 18, 1978 through 2001.  
 REMARKS: Records show the pumping of ground water from the 242 well field east of San Luis, Arizona. This water is considered as part of the volumes arriving at the land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0.79	0	0	0	0	0	0	0
2	0	0	0	0	.81	0	0	0	0	0	0	0
3	0	0	0	0	.80	0	0	0	0	0	0	0
4	0	0	0	0	.79	0	0	0	0	0	0	0
5	0	0	0	0	.80	0	0	0	0	0	0	0
6	0	0	0	0	.80	0	0	0	0	0	0	0
7	0	0	0	0	.80	0	0	0	0	0	0	0
8	0	0	0	0	.80	0	0	0	0	0	0	0
9	0	0	0	0	.81	0	0	0	0	0	0	0
10	0	0	0	0	.81	0	0	0	0	0	0	0
11	0	0	0	.24	.81	0	0	0	0	.02	0	0
12	0	0	0	.79	.81	0	0	0	0	0	0	0
13	0	0	0	.80	.82	0	0	0	0	0	0	0
14	0	0	0	.80	.82	0	0	0	0	0	0	0
15	0	0	0	.80	.79	0	0	0	0	.03	0	0
16	0	0	0	.80	.75	0	0	0	0	.03	0	0
17	0	0	0	.77	.64	0	0	0	0	.04	0	0
18	0	0	0	.77	.77	0	0	0	0	0	0	0
19	0	0	0	.78	.77	0	0	0	0	.08	0	0
20	0	0	0	.78	.78	0	0	0	0	0	0	0
21	0	0	0	.78	.78	0	0	0	0	0	0	0
22	0	0	0	.78	.39	0	0	0	0	0	0	0
23	0	0	0	.78	0	0	0	0	0	0	0	0
24	0	0	0	.76	0	0	0	0	0	0	0	0
25	0	0	0	.78	0	0	0	0	0	0	0	0
26	0	0	0	.78	0	0	0	0	0	0	0	0
27	0	0	0	.78	0	0	0	0	0	0	0	0
28	0	0	0	.78	0	0	0	0	0	0	0	0
29	0	0	0	.79	0	0	0	0	0	0	0	0
30	0	0	0	.79	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	15.13	16.94	0	0	0	0	0.20	0	0

Current Year 2001

Period 1979-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume--Thousand Cubic Meters			
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum
				Day	Low						
Jan.	0	0	! 1	0	! 1	0	0	757	3,406	0	
Feb.	0	0	! 1	0	! 1	0	0	1,145	3,677	0	
Mar.	0	0	! 1	0	! 1	0	0	1,163	4,717	0	
April	.220	0	16	.83	! 1	0	.50	1,307	4,265	0	
May	.235	0	17	.94	123	0	.55	1,464	4,269	0	
June	0	0	! 1	0	! 1	0	0	1,187	4,272	0	
July	0	0	! 1	0	! 1	0	0	1,376	5,868	0	
Aug.	0	0	! 1	0	! 1	0	0	1,393	4,988	0	
Sept.	0	0	! 1	0	! 1	0	0	1,186	3,397	0	
Oct.	.065	0	17	.14	! 1	0	.01	17.3	795	3,344	
Nov.	0	0	! 1	0	! 1	0	0	338	2,101	0	
Dec.	0	0	! 1	0	! 1	0	0	726	3,654	0	
Yearly	0.235	0		0.94		0	0.09	2,788	12,689	38,461	201

! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5348.00 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, West Main Canal Wasteway, 242 Lateral, and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sanchez Mejorada Canal near San Luis, Arizona. The mean daily discharges are combined and rounded and the monthly volumes are obtained by adding the volumes of the four stations.

RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: February 23, 1971 through 2001; 242 Lateral from November 1978 through 2001.

REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway, West Main Canal Wasteway, the Yuma Main Drain, and 242 Lateral are published separately on preceding pages of this bulletin.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.24	4.38	4.47	4.62	5.20	4.71	4.55	4.03	3.60	5.21	5.70	5.88
2	4.49	3.82	3.84	5.03	5.36	4.13	4.72	3.89	3.79	4.76	5.38	6.24
3	4.17	3.85	3.80	4.11	4.98	4.88	3.65	3.74	4.34	4.20	5.63	4.91
4	5.41	4.19	3.95	3.65	4.95	4.54	4.07	3.72	3.74	4.01	6.19	4.51
5	4.63	4.41	3.84	4.28	5.30	5.02	4.75	4.69	3.74	5.23	6.50	4.12
6	4.77	4.36	3.44	4.02	6.01	4.64	4.77	3.21	3.51	5.33	5.75	4.06
7	5.19	4.02	4.65	4.10	5.83	4.41	4.92	2.83	4.27	5.83	6.27	5.34
8	4.42	4.38	6.06	5.17	4.76	4.60	4.72	2.39	3.80	5.73	6.02	4.75
9	4.60	4.31	3.87	4.58	4.73	4.23	4.66	2.17	5.02	4.86	5.24	4.71
10	4.51	4.79	3.09	4.26	5.14	4.16	4.87	3.30	4.56	5.36	4.60	4.67
11	3.68	4.55	3.30	5.00	5.75	3.97	4.16	3.19	4.22	4.99	5.72	3.88
12	4.72	4.53	3.38	5.24	5.14	4.04	4.75	2.92	4.64	5.04	5.42	3.94
13	4.12	4.11	4.43	5.02	6.07	4.56	4.65	3.56	3.95	4.76	6.00	4.00
14	3.65	4.28	4.77	5.59	5.87	4.08	4.21	3.09	4.11	5.59	5.05	4.91
15	4.22	4.58	3.43	5.45	5.51	4.06	4.18	3.06	3.66	6.18	5.37	5.64
16	4.24	4.22	3.02	5.01	5.30	4.05	3.46	3.07	3.08	4.77	5.12	5.15
17	4.29	4.53	3.82	5.20	5.33	4.58	3.43	3.55	4.67	5.33	4.81	5.87
18	4.38	5.62	3.43	4.61	5.53	3.88	4.62	4.09	4.62	4.48	5.49	4.85
19	4.37	4.37	3.51	4.82	5.86	3.78	3.83	4.38	4.59	5.85	5.38	5.82
20	4.20	4.54	4.08	5.19	6.71	4.16	3.58	4.31	4.54	6.07	5.24	5.09
21	4.20	4.81	4.04	5.55	7.07	3.85	3.74	3.87	5.27	6.28	5.91	4.88
22	4.48	4.86	4.02	5.94	5.42	3.61	4.82	3.57	4.39	6.51	5.74	4.46
23	3.55	4.81	3.90	5.43	4.58	3.72	4.14	3.34	4.92	5.53	5.08	4.39
24	3.78	5.89	4.22	5.19	4.61	4.09	4.04	3.96	5.37	5.94	4.66	4.47
25	4.67	4.83	4.70	4.81	5.01	3.52	4.48	4.11	4.49	5.91	4.82	4.70
26	4.45	5.08	4.62	5.72	4.86	3.71	3.76	3.74	5.24	5.86	5.25	3.93
27	4.36	5.24	5.08	5.62	4.95	3.84	3.72	3.53	4.67	4.87	5.35	3.93
28	3.66	5.56	4.11	5.68	3.72	3.64	4.17	2.93	5.17	6.22	5.51	4.37
29	4.43		4.90	5.05	3.91	4.09	4.25	3.02	5.60	5.39	5.42	4.67
30	3.66		4.26	5.24	3.97	3.43	4.01	4.31	4.64	4.80	5.90	4.68
31	4.17		3.95		3.81		3.91	4.14		5.66		4.43
Sum	134.71	128.92	125.98	149.18	161.24	123.98	131.52	109.71	132.21	166.55	164.52	146.82

Current Year 2001

Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	φ High		φ Low			Total	Average	Maximum	Minimum
			Day		Day						
Jan.			4	5.41	23	3.55	4.35	11,639	11,880	14,963	2,619
Feb.			24	5.89	2	3.82	4.60	11,139	11,662	15,998	2,495
Mar.			8	6.06	16	3.02	4.06	10,885	13,114	16,904	2,864
April			22	5.94	4	3.65	4.97	12,889	13,217	16,013	2,611
May			21	7.07	28	3.72	5.20	13,931	13,530	17,145	3,050
June			5	5.02	30	3.43	4.13	10,712	12,314	15,505	3,115
July			7	4.92	17	3.43	4.24	11,363	12,487	15,320	3,610
Aug.			5	4.69	9	2.17	3.54	9,479	12,549	15,612	3,687
Sept.			29	5.60	16	3.08	4.41	11,423	12,435	15,357	3,210
Oct.			22	6.51	4	4.01	5.37	14,390	13,704	17,143	4,248
Nov.			5	6.50	10	4.60	5.48	14,215	12,800	15,680	4,202
Dec.			2	6.24	11	3.88	4.74	12,685	12,576	14,863	3,562
Yearly				7.07		2.17	4.59	144,750	152,268	183,801	39,274

φ Mean daily

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5222.00 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder was located in Mexico on the right bank of the river about 305 meters upstream from the southerly international boundary, 3.2 kilometers west of San Luis, Arizona, and 35 kilometers downstream from Morelos Dam. The zero of the gage was at mean sea level, U. S. C. & G. S. datum. This gage was destroyed on January 19, 1983. Between January 19, 1983 and December 10, 1985, temporary gages were installed on the United States side and levels were established to ensure continuous record. On December 10, 1985, a permanent water-stage recorder was relocated on the left bank of the river about 24 meters upstream from the southerly international boundary. On January 30, 1998 a new gage was installed on the left bank of the river about 305 meters downstream from the southerly international boundary.

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 2000; continuous record of gage heights, January 1947 through 1993. During 1993, from January 1 to February 4 and May 1, 1993 to January 30, 1998, the gage was inoperable. Records of gage height and discharge were estimated from instantaneous observations and discharge measurements. Monthly flows for this station have been derived for the period January 1935 through 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured 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, 937 CMS on August 19, 1983; maximum gage height, 25.860 meters on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.5	1.46	129	2.19	1.02	0.38	0.25	0.25	0.34	0.21	1.09	0.18
2	15.3	1.53	74.1	2.15	.79	.38	.33	.14	.29	.32	.92	.21
3	11.3	1.55	33.5	1.31	.45	.45	.29	.09	.25	.67	1.78	.31
4	12.1	1.49	12.2	.74	.47	.68	.20	.16	.72	.33	2.66	.39
5	8.23	1.56	11.5	.93	.40	.45	.14	.12	1.78	.26	7.01	.47
6	6.73	1.30	10.6	.99	.43	.33	.16	.10	.35	.26	3.85	.59
7	5.88	1.31	17.7	.84	1.28	.33	.18	.09	.26	1.74	2.92	.68
8	5.93	1.28	39.6	.42	1.33	.33	.28	.08	.22	2.17	.19	.82
9	4.41	1.34	62.8	.68	.35	.36	.29	.05	.24	2.41	.17	1.17
10	5.29	1.44	86.4	.50	.29	.31	4.70	.05	.45	.45	.19	1.24
11	6.82	1.32	44.5	.38	.26	.41	13.8	.05	1.51	.24	1.17	1.54
12	5.38	1.78	25.0	.33	.41	.43	5.56	3.48	.39	.19	4.32	1.52
13	6.48	1.94	19.6	.08	.45	.38	1.36	11.9	.20	.17	2.52	2.30
14	10.6	1.88	17.0	.05	.98	.38	.57	6.58	.13	.14	3.14	2.78
15	3.87	2.19	14.0	.23	.88	.29	.46	2.98	.09	1.02	3.31	2.99
16	2.39	2.60	10.8	4.53	1.03	.24	.25	1.13	.08	2.85	3.28	2.37
17	2.09	3.01	9.12	4.07	.50	.44	.15	.95	.08	1.76	1.86	1.84
18	2.19	3.58	8.28	2.44	.57	.57	.06	.40	.05	.22	1.86	.96
19	11.7	4.21	10.3	1.61	.71	.29	.07	.18	.05	.13	1.73	.63
20	6.24	4.43	13.7	.18	.96	.21	.33	.15	.09	.14	1.51	1.11
21	2.61	4.66	13.3	.05	2.02	.21	.24	.32	.23	.12	.46	2.03
22	2.70	5.03	11.5	.06	1.96	.20	.39	.36	.28	.14	1.03	1.78
23	2.09	5.36	9.67	6.99	1.87	.20	.75	.20	.27	.21	1.3	1.66
24	1.65	5.85	8.25	5.79	1.79	.27	.71	.36	.33	1.19	.98	1.16
25	1.43	6.68	6.43	1.56	1.73	.26	.27	.22	9.62	2.35	.07	2.63
26	1.40	7.47	5.20	.38	1.78	.37	.12	1.04	4.38	.60	4.79	4.52
27	3.47	36.1	7.75	.32	1.52	.26	.17	2.33	.57	4.24	4.81	2.53
28	4.50	88.9	4.15	.33	1.71	.18	.12	2.61	.62	9.6	3.81	1.56
29	1.69		3.14	.40	1.66	.17	.12	2.22	.38	2.99	.16	1.67
30	1.20		2.73	.96	1.16	.19	.11	.44	.26	2.57	.18	1.47
31	1.26		2.50		.61		.16	1.01		.43		1.32
Sum	167.43	201.25	724.30	41.49	31.37	9.95	32.59	40.04	24.51	31.48	61.77	46.43

Current Year 2001

Period 1935-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Volume-Thousand Cubic Meters				
	High	Low	Day	High	Day	Low	Average	Total	Average	Maximum	Minimum
Jan.	22.990	22.120	2	19.6	27	1.08	5.40	14,466	400,811	2,062,379	0
Feb.	23.990	22.085	28	117	16	1.20	7.19	17,388	329,193	1,708,370	0
Mar.	24.130	22.205	1	135	30	2.04	23.4	62,580	276,571	1,458,432	0
April	22.690	21.865	23	11.9	15	.04	1.38	3,585	179,902	947,722	0
May	22.260	22.030	23	2.57	11	.23	1.01	2,710	240,833	1,430,837	0
June	22.140	21.955	18	.92	128	.14	.33	860	205,371	1,455,506	0
July	22.950	21.880	11	20.3	118	.04	1.05	2,816	176,898	1,821,962	0
Aug.	22.770	21.855	112	14.7	18	.05	1.29	3,459	191,153	2,103,318	0
Sept.	22.690	21.985	25	12.2	118	.04	.82	2,118	221,147	1,956,768	0
Oct.	22.505	21.955	27	7.93	119	.08	1.02	2,720	259,139	2,144,909	0
Nov.	22.500	21.805	5	7.93	22	.02	2.06	5,337	298,803	1,761,409	0
Dec.	22.165	21.640	26	6.57	1	.12	1.50	4,012	368,139	2,268,370	0
Yearly	24.130	21.640		135		0.02	3.87	122,051	3,147,960	15,656,495	0

1 And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5222.01 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

## MEAN DAILY GAGE HEIGHT IN METERS 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	22.615	22.125	24.080	22.235	22.185	22.075	22.035	22.045	22.065	22.065	22.170	22.040
2	22.820	22.130	23.655	22.240	22.165	22.075	22.075	21.975	22.045	22.105	22.155	22.060
3	22.650	22.135	23.180	22.200	22.125	22.090	22.065	21.935	22.030	22.160	22.185	22.105
4	22.690	22.125	22.475	22.165	22.125	22.120	22.005	21.990	22.100	22.115	22.225	22.125
5	22.515	22.135	22.420	22.180	22.115	22.095	21.960	21.955	22.190	22.090	22.460	22.115
6	22.445	22.105	22.345	22.180	22.120	22.060	21.980	21.935	22.090	22.080	22.295	22.105
7	22.405	22.105	22.795	22.170	22.195	22.060	22.000	21.930	22.070	22.225	22.230	22.090
8	22.410	22.100	23.365	22.135	22.200	22.060	22.055	21.905	22.055	22.245	22.040	22.075
9	22.335	22.110	23.565	22.160	22.090	22.070	22.065	21.860	22.075	22.250	22.025	22.070
10	22.375	22.120	23.750	22.145	22.065	22.055	22.280	21.860	22.130	22.135	22.035	22.045
11	22.445	22.105	23.415	22.125	22.045	22.085	22.735	21.860	22.230	22.075	22.110	22.035
12	22.380	22.170	23.115	22.100	22.115	22.090	22.395	22.150	22.130	22.055	22.345	22.000
13	22.430	22.175	22.965	21.945	22.125	22.075	22.190	22.655	22.095	22.040	22.195	22.020
14	22.625	22.115	22.845	21.900	22.175	22.080	22.130	22.420	22.060	22.025	22.255	22.020
15	22.305	22.100	22.620	21.990	22.170	22.030	22.120	22.250	22.025	22.105	22.300	22.000
16	22.230	22.095	22.410	22.330	22.175	22.020	22.070	22.150	22.030	22.265	22.295	21.915
17	22.210	22.100	22.325	22.330	22.120	22.090	22.010	22.140	22.040	22.185	22.180	21.830
18	22.215	22.120	22.310	22.250	22.125	22.100	21.915	22.065	22.005	22.065	22.210	21.710
19	22.655	22.145	22.465	22.210	22.140	22.040	21.915	21.995	21.995	22.010	22.225	21.675
20	22.420	22.125	22.670	21.975	22.150	22.005	22.100	21.965	22.045	22.015	22.210	21.750
21	22.240	22.100	22.665	21.880	22.210	22.000	22.045	22.055	22.130	21.995	22.015	21.810
22	22.245	22.100	22.580	21.895	22.205	21.995	22.095	22.050	22.145	22.010	21.850	21.790
23	22.210	22.090	22.495	22.390	22.200	21.995	22.150	21.990	22.135	22.055	22.050	21.785
24	22.185	22.100	22.440	22.415	22.190	22.035	22.150	22.035	22.155	22.120	22.065	21.745
25	22.175	22.140	22.360	22.175	22.185	22.035	22.045	21.980	22.580	22.205	21.940	21.865
26	22.175	22.175	22.310	22.090	22.190	22.075	21.970	22.105	22.365	22.095	22.360	22.015
27	22.280	22.255	22.445	22.075	22.175	22.050	22.005	22.170	22.185	22.320	22.365	21.865
28	22.345	23.770	22.285	22.080	22.180	21.985	21.970	22.175	22.160	22.115	22.300	21.790
29	22.185		22.245	22.105	22.180	21.980	21.965	22.150	22.135	22.235	22.030	21.800
30	22.140		22.240	22.175	22.150	21.995	21.955	22.020	22.095	22.225	22.040	21.785
31	22.130		22.235		22.110		21.995	22.060		22.120		21.770
Avg.	22.370	22.220	22.745	22.140	22.150	22.050	22.080	22.060	22.120	22.125	22.170	21.930

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-5333.00 WELLTON-MOHAWK BYPASS DRAIN AT SOUTHERLY INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and Parshall flume located 24 meters upstream from the southerly land boundary, 168 meters east of the Colorado River, and 2.9 kilometers west of San Luis, Arizona. The zero of the gage has not been determined.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Station is operated by United States Section of the Commission. Records available: June 23, 1977 through 2001.

REMARKS: Pursuant to Minute No. 242 of the Commission, a bypass drain of the Wellton-Mohawk extension channel was constructed from Morelos Dam to the Santa Clara Slough in Mexico along the left bank of the Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.76	4.79	3.97	4.15	4.23	4.16	4.08	0.05	4.15	3.28	4.48	6.23
2	4.74	4.58	3.88	3.86	3.97	4.13	3.94	.58	4.09	3.22	4.70	5.88
3	4.52	4.52	3.94	3.86	3.81	4.17	3.91	2.78	4.06	3.05	4.78	6.06
4	4.79	4.36	3.93	4.06	3.91	4.11	3.96	2.68	3.98	3.45	4.96	6.06
5	4.73	4.42	4.19	4.02	4.10	3.99	3.88	2.57	4.28	3.05	4.78	6.77
6	4.72	4.34	4.30	4.07	3.89	4.04	3.82	2.39	4.12	3.28	4.63	6.63
7	4.90	4.28	4.90	4.11	4.01	4.01	2.11	2.40	4.25	3.05	4.45	5.91
8	4.61	4.29	4.26	4.09	3.94	4.12	.60	2.64	4.04	3.16	4.60	7.01
9	4.71	4.20	4.14	4.35	3.78	4.15	.34	.72	4.31	3.16	4.76	7.10
10	4.57	4.40	4.09	4.08	3.90	3.96	.64	.09	4.37	3.44	5.17	7.14
11	4.94	4.23	4.17	4.07	4.04	3.89	1.02	.08	4.27	4.22	4.86	6.12
12	4.79	4.13	4.30	4.09	4.01	3.84	1.49	.08	4.37	4.27	4.77	5.91
13	4.87	4.19	4.42	3.98	3.87	3.11	.47	.08	4.43	4.39	4.89	5.79
14	4.76	4.39	4.41	3.98	3.87	3.94	.31	.22	4.53	4.67	5.13	5.57
15	4.76	4.00	4.23	4.10	3.97	4.13	.15	2.28	4.55	4.40	4.68	5.39
16	4.64	4.26	4.58	3.95	4.08	4.04	.19	2.46	4.63	4.59	4.92	5.61
17	4.52	4.25	4.18	3.98	4.17	3.96	.08	2.30	4.40	4.37	5.00	5.64
18	4.67	4.23	4.39	4.10	4.05	4.02	.05	2.45	4.62	4.10	4.73	6.76
19	4.55	4.19	4.45	4.01	4.10	3.99	.04	2.24	4.73	4.10	5.36	7.34
20	4.60	4.41	4.40	4.10	4.12	4.07	.04	2.27	4.66	4.57	7.47	7.31
21	4.50	3.98	4.59	4.21	4.13	4.11	.04	2.45	3.14	4.34	7.41	7.54
22	4.51	4.10	4.42	4.01	4.03	4.23	.04	2.96	2.93	4.16	7.09	7.43
23	4.40	4.01	4.39	3.91	3.93	4.19	.04	3.01	3.11	4.39	7.01	7.29
24	4.18	3.94	4.23	3.88	4.03	4.02	.04	3.10	3.26	4.78	7.08	7.44
25	4.23	3.99	4.17	3.96	3.86	4.06	.05	3.36	3.29	4.42	7.25	7.34
26	4.42	4.00	4.22	4.17	4.06	4.05	.04	3.27	3.02	4.33	7.49	7.13
27	4.65	4.30	4.04	4.15	3.85	4.07	.04	3.32	3.22	4.48	6.94	7.13
28	4.75	4.33	3.99	4.35	4.03	4.02	.04	3.58	3.34	4.33	7.43	7.20
29	4.63		3.92	4.38	3.93	4.12	.04	3.96	3.31	4.09	6.93	7.41
30	4.61		3.91	4.51	3.97	4.17	.04	4.08	3.22	4.26	6.52	7.29
31	4.77		3.98		3.86		.04	4.10		4.26		7.11
Sum	143.80	119.11	130.99	122.54	123.50	120.86	31.57	68.35	118.68	123.66	170.27	207.79

Current Year 2001

Period 1977-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Volume-Thousand Cubic Meters				
	High	Low	Day	High		Average	Total	Average	Maximum	Minimum	
				Day	Low						
Jan.	0.530	0.465	11	5.17	24	4.64	12,424	13,935	21,638	7,412	
Feb.	.530	.445	1	5.06	15	3.71	10,291	13,386	18,374	8,506	
Mar.	.535	.440	7	5.12	29	3.79	4,23	11,318	14,666	21,496	9,755
April	.495	.430	9	4.59	2	3.68	4.08	10,587	13,353	20,613	3,445
May	.485	.420	1	4.44	9	3.53	3.98	10,670	13,499	20,732	5,215
June	.475	.375	3	4.42	13	3.05	4.03	10,442	12,427	19,842	2,227
July	.455	.010	1	4.23	119	.02	1.02	2,728	12,605	22,235	2,728
Aug.	.460	.025	30	4.23	1	.04	2.20	5,905	12,601	22,444	3,656
Sept.	.500	.360	20	4.88	22	2.89	3.96	10,254	11,987	23,538	51.4
Oct.	.525	.350	16	5.06	3	2.78	3.99	10,684	12,867	23,600	23.9
Nov.	.670	.475	28	7.69	6	4.24	5.68	14,711	11,713	20,944	59.2
Dec.	.670	.530	21	7.82	11	5.33	6.70	17,953	13,012	22,518	138
Yearly	0.670	0.010		7.82		0.02	4.06	127,967	156,051	222,488	75,784

! And other days

## 09-5350.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 27 IN MEXICO

DESCRIPTION: Water-stage recorder and cableway located on the left bank of the canal wasteway immediately upstream from where it discharges into the Colorado River, 1.0 kilometer downstream from the wasteway gates on the Central Feeder Canal on the right bank of the Colorado River, 27 kilometers downstream from Morelos Dam, and 250 meters south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

RECORDS: Data obtained and computed by the Colorado River Irrigation District 14 of the National Water Commission and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. Records available: April 1956 through 2001.

REMARKS: The Colorado River Irrigation District 14 transports water for irrigation of land on the left bank of the Colorado River by the Central Feeder Canal 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 Sanchez Mejorada Siphon, which was placed in operation on June 28, 1963. As part of the rehabilitation works, started in 1968, of the Colorado River Irrigation District, the Canal de Conexión was enlarged and lined, and is now known as the Central Feeder Canal.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1964 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	14,135	11,288	85,761	0
February	12,544	6,254	50,898	0
March	35,417	9,070	72,049	0
April	4,925	13,337	85,372	0
May	1,529	13,033	99,576	0
June	0	10,836	61,705	0
July	6,380	11,165	56,912	0
August	7,163	16,535	132,183	0
September	8,410	14,965	83,943	0
October	3,549	13,762	136,198	0
November	1,114	12,853	122,170	0
December	4,261	11,276	86,607	0
Yearly	99,427	142,531	628,347	0

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 09-5365.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 38 IN MEXICO

DESCRIPTION: Wasteway to the Colorado River on the left bank of new Barrote Canal at old dam and bridge at Kilometer 18,251 (old Kilometer 38,000). The wasteway is located in the Colonia Bojorquez 1.3 kilometers upstream from the Sonora-Baja California railroad bridge, 5.9 kilometers downstream from the Miguel C. Rodriguez gaging station, and 45 kilometers downstream from the southerly international boundary.

RECORDS: The records are computed by the National Water Commission and are based upon gate openings. Records available: January 1964 through 2001.

REMARKS: The wasteway structure on the left bank of the Colorado River has two manually operated radial gates 3.0 meters wide. It discharges into a dirt canal 200 meters long with a total capacity of 13.0 CMS which discharges to the river.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1964 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	1,194	1,723	10,541	0
February	2,102	1,428	12,035	0
March	4,654	854	5,932	0
April	0	387	5,555	0
May	0	1,382	14,246	0
June	0	782	8,585	0
July	321	634	9,114	0
August	1,707	1,100	17,765	0
September	2,238	2,227	16,855	0
October	1,898	4,583	28,669	0
November	342	2,728	25,263	0
December	1,204	2,234	13,380	0
Yearly	15,660	19,098	103,228	0

## 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 million cubic meters. 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 MILLION CUBIC METERS

Month	LAKE MEAD (Capacity 32,266)		LAKE MOHAVE (Capacity 2,232)		HAVASU LAKE (Capacity 764)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 35,263)	
	2001	Average 1935-2001	2001	Average 1951-2001	2001	Average 1939-2001	2001	Estimated Average
Jan.	27,781.7	23,466.7	2,047.6	2,052.8	687.0	683.0	30,516.3	26,202.5
Feb.	27,667.0	23,331.3	2,019.2	2,064.7	738.4	686.4	30,424.6	26,082.4
Mar.	27,326.5	23,063.9	2,109.3	2,070.6	723.2	700.8	30,159.0	25,835.3
April	26,647.9	23,060.6	2,152.4	2,060.5	737.6	736.9	29,537.9	25,858.0
May	26,059.7	23,721.8	2,069.8	2,126.3	732.1	744.4	28,861.6	26,592.5
June	25,356.6	24,742.7	2,083.3	2,026.7	733.2	739.3	28,173.1	27,508.7
July	24,971.8	24,874.7	2,040.2	1,896.9	713.6	725.9	27,725.6	27,497.5
Aug.	24,838.6	24,684.8	2,053.7	1,851.6	717.4	711.6	27,609.7	27,248.0
Sept.	24,512.9	24,485.3	1,983.4	1,806.1	702.6	703.2	27,198.9	26,994.6
Oct.	24,524.0	24,281.8	1,815.7	1,792.0	708.6	699.2	27,048.3	26,773.0
Nov.	24,393.3	24,133.9	1,887.2	1,865.7	679.6	687.9	26,960.1	26,687.5
Dec.	24,416.7	23,971.7	2,040.2	1,977.1	680.3	688.1	27,137.2	26,636.9
Avg.	25,708.1	23,984.9	2,025.2	1,965.9	712.8	708.9	28,446.0	26,659.7
Max.	27,781.7	! 34,266.1	2,152.4	! 2,230.1	738.4	! 849.5	30,516.3	! 35,934.1
Min.	24,393.3	* 13,231.5	1,815.7	!!!1,462.9	679.6	!! 94.9	26,960.1	!!!16,112.5

! Maximum end of month storage for period of record

!! Minimum end of month storage for period of record

\* Minimum end of month storage since 1940

SUSPENDED SILT - 2001

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.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

2001	Time	Stream-flow, Momentary		Gravimetric Percent	Date	Time	Stream-flow, Momentary		Gravimetric Percent	Date	Time	Stream-flow, Momentary		Gravimetric Percent
		Std.	CMS				Std.	CMS				Std.	CMS	
Jan.	3	0900	72.4	0.0044	June 7	0905	54.6	0.0055	Nov. 7	0705	38.7	0.0029		
	11	0935	102	0.0026		14	0810	55.8		0.0064	15	0830	39.4	0.0094
	18	0925	62.6	0.0061		20	0700	56.7		0.0066	21	0910	44.4	0.0036
Feb.	25	0845	70.3	0.0035	July 5	0825	58.0	0.0068	Dec. 6	29	0850	42.5	0.0031	
	31	0740	86.0	0.0026		11	0800	58.1		0.0060	6	0925	52.2	0.0051
	8	0840	86.7	0.0029		11	0555	99.9		0.0057	13	0900	55.2	0.0033
	15	0915	78.4	0.0056		18	0610	54.7		0.0074	20	0850	49.7	0.0017
Mar.	22	1040	102	0.0018	Aug. 1	26	0805	81.1	0.0062	26	0925	45.0	0.0028	
	28	0930	226	0.0046		9	0640	49.5	0.0046					
	8	0900	122	0.0038		9	0815	63.6	0.0032					
	15	0655	89.2	0.0076		15	0645	61.0	0.0017					
	22	0915	99.6	0.0025		22	0640	45.7	0.0041					
Apr.	29	0755	92.0	0.0051	Sept. 5	29	0700	38.2	0.0040					
	5	0805	92.0	0.0036		5	0645	41.0	0.0043					
	12	0820	86.1	0.0033		12	0645	41.5	0.0057					
	18	0755	86.0	0.0029		19	0645	38.6	0.0042					
May	26	0835	74.2	0.0041	Oct. 4	26	0655	55.9	0.0018					
	4	0820	54.1	0.0071		4	0815	31.4	0.0039					
	10	0820	38.1	0.0073		10	0750	31.7	0.0039					
	17	0855	40.8	0.0024		18	0745	31.4	0.0034					
	24	0805	50.9	0.0068		25	0745	41.8	0.0021					
	30	0645	46.2	0.0054		31	0715	30.8	0.0018					

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

2001	Monthly Weight Megagrams			Number of Samples	Gravimetric Percentages			* Silt Volume - Thousand Cubic Meters			
	Water		Silt		Average	Maximum Sample	Minimum Sample	Total 2001	Period 1952 - 2001		
	Average	Maximum							Average	Maximum	Minimum
Jan.	175,090,000	4,029	5	0.0047	0.0023	0.0005	2.96	11.4	62.6	0.30	
Feb.	194,452,000	1,953	4	0.0010	0.0080	0.0000	1.43	12.9	127.8	1.10	
Mar.	221,746,000	3,273	4	0.0015	0.0042	0.0005	2.40	51.2	605.2	1.10	
April	219,914,000	6,578	4	0.0030	0.0077	0.0005	4.83	55.5	856.8	2.80	
May	121,392,000	1,425	5	0.0012	0.0018	0.0005	1.05	19.8	318.2	1.30	
June	138,741,000	2,011	4	0.0014	0.0080	0.0005	1.48	30.8	256.6	2.50	
July	160,885,000	1,702	4	0.0011	0.0022	0.0005	1.25	38.3	189.8	2.80	
Aug.	122,334,000	1,279	5	0.0010	0.0031	0.0005	0.94	35.1	166.9	2.36	
Sept.	113,676,000	3,239	4	0.0028	0.0084	0.0005	2.38	16.1	72.9	1.78	
Oct.	87,774,000	2,088	5	0.0024	0.0042	0.0005	1.53	8.87	124.0	0.40	
Nov.	104,112,000	820	4	0.0008	0.0024	0.0000	0.60	8.90	165.2	0.30	
Dec.	136,063,000	1,270	4	0.0009	0.0015	0.0005	0.93	8.90	54.4	0.84	
Year	1,796,179,000	29,667	52	0.0018	0.0084	0.0004	21.8	297.8	2,706.5	40.2	

\* Volume calculated at 1.362 megagrams per cubic meter

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

2001	Time	Stream-flow, Momentary	Gravimetric Percent	Date	Time	Stream-flow, Momentary	Gravimetric Percent	Date	Time	Stream-flow, Momentary	Gravimetric Percent
Date	Std.	CMS			Std.	CMS			Std.	CMS	
Mar. 1	1215	135	0.0051								

Samples by U.S. Section and analyses by United States Bureau of Reclamation, Method A

CHEMICAL ANALYSES OF WATER SAMPLES  
2001

The tables below are based on chemical analyses of samples from the Colorado River taken at the Northerly International Boundary by the United States Section of the Commission and analyzed under a contract with the U. S. Bureau of Reclamation.

Colorado River at Northerly International Boundary

2001 Date	Time Standard	Streamflow Momentary CMS	Specific Conductance Microsiemens/ cm	pH Units	Hardness, Total (as CaCO <sub>3</sub> ) mg/L	Hardness, Noncarbonate (CaCO <sub>3</sub> ) mg/L	Calcium ion (Ca), Dissolved mg/L	Magnesium ion (Mg), Dissolved mg/L
Jan. 8	0800	58.7	1,400	8.2	371.00	198.00	94.3	32.9
22	0745	64.3	1,430	8.3	385.00	209.00	97.7	34.5
Feb. 5	0740	77.7	1,360	8.3	360.00	194.00	91.1	32.1
20	1015	92.4	1,230	8.2	334.00	176.00	83.3	30.8
Mar. 5	0745	88.7	1,310	8.3	357.00	192.00	89.8	32.2
19	0700	95.8	1,150	8.2	325.00	177.00	82.3	29.0
April 2	1130	92.5	1,130	8.2	316.00	168.00	81.0	27.5
16	0815	142	1,090	8.2	315.00	172.00	79.0	28.6
May 7	0730	44.0	1,390	8.2	375.00	208.00	94.0	34.2
21	0800	58.7	1,360	8.2	342.00	177.00	84.0	32.2
June 4	0800	52.8	1,410	8.3	366.00	195.00	91.4	33.5
18	0715	57.3	1,320	8.2	355.00	195.00	90.0	31.7
July 2	0815	71.6	1,260	8.2	378.00	222.00	97.2	32.9
16	0730	59.1	1,300	8.2	345.00	186.00	85.9	31.8
Aug. 6	0730	69.9	1,370	8.2	357.00	193.00	88.9	33.0
20	0705	48.9	1,330	8.2	345.00	182.00	85.0	32.3
Sept. 10	0745	37.4	1,480	8.1	357.00	182.00	87.0	33.8
24	0800	70.3	1,350	8.1	344.00	184.00	84.0	32.7
Oct. 1	0915	35.8	1,720	8.2	405.00	216.00	100	37.8
15	0800	30.6	1,710	8.1	397.00	206.00	96.0	38.3
Nov. 5	0800	35.2	1,590	8.3	385.00	201.00	95.0	35.9
19	0800	41.2	1,520	8.0	389.00	208.00	97.0	35.6
Dec. 3	0800	52.3	1,420	8.1	377.00	202.00	95.0	33.9
17	0800	52.0	1,410	8.2	380.00	205.00	96.0	34.1

2001 Date	Sodium ion (Na), Dissolved mg/L	Potassium ion (K) Dissolved mg/L	Sulfate ion (SO <sub>4</sub> ) Dissolved mg/L	Chloride ion (Cl), Dissolved mg/L	Carbonate (as CO <sub>3</sub> ) mg/L	Bicarbonate (as HCO <sub>3</sub> ) mg/L	Nitrate (as NO <sub>3</sub> ) mg/L	Total Solids Dissolved (Calculated) mg/L
Jan. 8	157	4.6	320	154	N.D.	211	1.4	881
22	165	4.7	323	161	N.D.	215	1.6	907
Feb. 5	143	4.5	300	142	N.D.	203	1.5	826
20	135	4.3	284	127	N.D.	193	1.5	772
Mar. 5	144	4.7	306	142	N.D.	201	1.3	831
19	112	4.2	258	117	N.D.	181	1.5	704
April 2	112	5.0	254	111	N.D.	181	1.6	686
16	110	5.0	246	105	N.D.	174	1.6	666
May 7	161	5.0	293	152	N.D.	204	2.3	854
21	152	5.0	294	148	N.D.	201	1.8	823
June 4	157	5.0	309	155	N.D.	209	2.0	864
18	140	5.0	294	142	N.D.	195	1.1	807
July 2	140	4.5	294	124	N.D.	190	0.6	799
16	139	5.0	305	141	N.D.	194	1.1	817
Aug. 6	154	5.0	313	158	N.D.	200	1.2	865
20	149	4.0	305	147	N.D.	199	1.2	835
Sept. 10	170	5.0	332	178	N.D.	214	2.0	928
24	155	5.0	312	150	N.D.	195	1.5	849
Oct. 1	212	5.0	391	223	N.D.	231	3.0	1,100
15	201	5.0	353	213	N.D.	233	3.9	1,040
Nov. 5	189	5.0	342	188	N.D.	224	6.5	987
19	186	5.0	332	182	N.D.	221	1.5	963
Dec. 3	158	5.0	327	155	N.D.	214	1.7	894
17	157	4.0	330	158	N.D.	214	1.4	899

N.D. - Not Detected

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples taken at the Colorado River station and in Mexican canals. Samples were taken at the Northerly International Boundary and at the Southerly International Boundary by the United States Section of the Commission. Determinations for the Northerly International Boundary were made by the Bureau of Reclamation and the United States Section of the Commission (jointly); and for the Southerly International Boundary, by the United States Section of the Commission. Samples for the Intake Canal at Morelos Dam were taken by the Mexican Section of the Commission, and determinations were made by the Ministry of Agriculture and Hydraulic Resources of Mexico.

## COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,370	1,270	1,070	1,140	1,300	1,350	1,270	1,400	1,430	1,720	1,620	1,430
2	1,390	1,230	1,170	1,130	1,330	1,370	1,260	1,360	1,430	1,750	1,610	1,420
3	1,360	1,260	1,220	1,180	1,300	1,390	1,240	1,330	1,430	1,690	1,600	1,420
4	1,290	1,290	1,260	1,190	1,320	1,410	1,260	1,340	1,430	1,760	1,600	1,430
5	1,260	1,360	1,310	1,170	1,340	1,390	1,280	1,360	1,430	1,680	1,590	1,380
6	1,310	1,270	1,430	1,190	1,370	1,380	1,280	1,370	1,400	1,720	1,500	1,380
7	1,350	1,280	1,280	1,190	1,390	1,380	1,280	1,240	1,410	1,750	1,500	1,390
8	1,400	1,260	1,280	1,190	1,300	1,350	1,270	1,350	1,430	1,790	1,480	1,390
9	1,530	1,260	1,200	1,190	1,390	1,360	1,270	1,400	1,460	1,820	1,500	1,390
10	1,450	1,260	1,220	1,190	1,400	1,370	1,110	1,540	1,480	1,830	1,500	1,390
11	1,320	1,270	1,250	1,180	1,400	1,380	1,130	1,480	1,480	1,620	1,500	1,400
12	1,340	1,270	1,270	1,190	1,420	1,330	1,190	1,420	1,440	1,590	1,500	1,380
13	1,370	1,240	1,290	1,190	1,440	1,390	1,220	1,360	1,310	1,630	1,500	1,360
14	1,390	1,200	1,280	1,160	1,460	1,380	1,250	1,410	1,310	1,670	1,460	1,370
15	1,410	1,220	1,250	1,120	1,420	1,340	1,270	1,270	1,330	1,710	1,490	1,390
16	1,440	1,250	1,200	1,090	1,430	1,330	1,300	1,320	1,350	1,740	1,500	1,400
17	1,390	1,240	1,180	1,140	1,450	1,330	1,240	1,460	1,370	1,710	1,510	1,410
18	1,380	1,240	1,170	1,190	1,440	1,320	1,250	1,420	1,430	1,680	1,510	1,440
19	1,250	1,240	1,150	1,190	1,410	1,310	1,310	1,370	1,460	1,660	1,520	1,380
20	1,310	1,230	1,150	1,200	1,390	1,290	1,330	1,330	1,430	1,590	1,500	1,390
21	1,360	1,250	1,160	1,210	1,360	1,290	1,340	1,400	1,580	1,510	1,420	1,390
22	1,430	1,210	1,160	1,210	1,290	1,290	1,360	1,340	1,500	1,440	1,410	1,400
23	1,410	1,210	1,150	1,220	1,300	1,300	1,370	1,370	1,430	1,530	1,400	1,410
24	1,310	1,220	1,150	1,200	1,350	1,310	1,360	1,450	1,350	1,500	1,400	1,410
25	1,270	1,230	1,140	1,230	1,340	1,320	1,280	1,470	1,430	1,430	1,390	1,420
26	1,290	1,240	1,140	1,210	1,340	1,300	1,220	1,480	1,440	1,480	1,390	1,430
27	1,290	1,120	1,110	1,220	1,350	1,300	1,310	1,500	1,350	1,480	1,400	1,470
28	1,300	1,100	1,110	1,240	1,360	1,270	1,340	1,470	1,560	1,480	1,330	1,560
29	1,300		1,170	1,250	1,360	1,280	1,370	1,460	1,610	1,480	1,450	1,530
30	1,320		1,170	1,270	1,270	1,280	1,400	1,440	1,670	1,630	1,430	1,500
31	1,260		1,170		1,410		1,380	1,430		1,640		1,470

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

SPECIFIC CONDUCTANCE OF WATER SAMPLES

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,330	1,220	1,200	1,530	1,310	#	1,370	1,400	1,440	1,670	1,680	1,510
2	1,320	1,250	1,260	1,230	1,340	1,460	1,360	1,350	1,460	1,750	1,560	1,480
3	1,270	1,280	1,280	1,220	1,330	1,440	1,270	1,330	1,430	1,710	1,620	1,280
4	1,270	1,320	1,370	1,230	1,360	1,440	1,300	1,350	#	1,780	1,620	1,470
5	1,180	1,370	1,390	1,230	1,400	1,470	1,340	1,340	1,410	1,690	1,590	1,410
6	1,240	1,340	1,470	1,240	1,400	1,460	1,290	1,350	1,420	1,740	1,510	1,380
7	1,290	1,300	1,400	1,220	1,400	1,410	1,290	1,260	1,440	1,820	1,520	1,360
8	1,300	1,340	1,310	1,520	1,360	1,420	1,340	1,310	1,400	1,850	1,510	1,400
9	1,400	1,300	1,340	1,190	1,410	1,410	1,330	1,320	1,490	1,380	1,470	1,430
10	1,380	1,310	1,190	1,230	1,440	1,610	1,140	1,560	1,490	1,830	1,470	#
11	1,350	1,290	1,220	1,220	1,380	1,470	1,100	1,560	1,410	1,780	1,470	1,410
12	1,400	1,280	1,290	1,220	1,410	1,460	1,230	1,480	1,490	1,580	1,440	1,380
13	1,320	1,310	1,300	1,220	1,460	1,490	1,250	1,470	1,320	1,650	1,470	1,400
14	1,300	1,260	#	1,220	1,470	#	1,330	1,480	1,360	1,760	1,440	1,410
15	1,340	1,270	1,300	1,430	1,420	1,390	1,230	1,330	1,270	1,750	1,290	1,400
16	1,420	1,640	1,310	1,120	1,430	1,390	1,340	1,300	1,480	1,770	1,300	1,410
17	1,440	1,300	1,260	1,170	1,500	1,340	1,510	1,430	1,420	1,740	1,520	1,430
18	1,430	1,230	1,340	#	1,450	1,360	1,320	1,280	#	1,730	1,530	1,420
19	1,290	1,250	1,300	1,240	1,420	1,340	1,340	1,350	#	1,350	1,540	1,400
20	1,330	1,320	1,320	1,250	1,450	1,320	1,340	1,310	1,370	1,690	1,540	1,430
21	1,370	#	1,310	1,270	1,440	1,340	1,340	1,400	1,610	1,660	1,440	1,420
22	1,410	1,310	1,300	1,300	1,310	1,330	1,370	1,340	1,630	1,520	1,280	1,400
23	#	1,260	1,200	1,210	1,310	1,330	1,450	1,360	1,630	1,570	1,420	1,400
24	#	1,220	1,180	1,250	1,390	1,420	1,380	1,420	1,420	1,570	1,420	1,370
25	1,320	1,230	1,260	1,270	1,400	1,350	1,260	1,480	1,360	1,400	1,430	1,430
26	1,300	#	1,210	1,220	1,420	1,320	1,240	1,490	1,510	1,450	#	1,390
27	1,250	#	1,150	1,280	1,470	1,320	1,330	1,520	1,350	1,590	1,420	1,460
28	1,270	#	1,170	1,290	1,440	1,300	1,400	1,410	1,540	1,540	1,350	1,550
29	1,250		1,230	1,290	1,410	1,310	1,270	1,460	1,650	1,550	1,440	1,520
30	1,480		1,210	1,300	1,310	1,340	1,400	1,460	1,480	1,580	1,280	1,500
31	1,210		1,240		#		1,390	1,420		1,630		1,510

# - Missing data

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 2001

2	January	1,300	20	March	1,200	1	May	1,880	17	July	1,720	18	September	1,800	20	November	1,360	
9		1,460																
14	February	1,410	2	April	1,400	1	June	1,540		August		16	October	1,810		December		
															4	1,740	18	1,540

RAINFALL ON THE COLORADO RIVER WATERSHED  
IN MILLIMETERS

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 following page in this bulletin.

## IN THE UNITED STATES

Month	Brawley, California		El Centro, California		Blythe, California		Yuma Citrus Station, Arizona		Bullhead City, Arizona	
	2001	Average 1931-2001	2001	Average 1931-2001	2001	Average 1931-2001	2001	Average 1931-2001	2001	Average 1978-2001
Jan.	#	10	6	11	24	12	10	10	48	29
Feb.	22	9	14	9	13	12	19	9	28	29
Mar.	12	7	14	6	38	10	#	7	15	27
April	0	2	0	2	1	3	2	7	5	5
May	0	1	0	0	0	1	#	1	0	2
June	0	0	0	0	0	1	#	1	0	0
July	0	1	T	2	32	5	#	6	T	9
Aug.	0	9	T	8	8	18	4	13	0	19
Sept.	0	8	0	8	0	10	0	11	0	10
Oct.	0	6	0	7	0	7	#	9	0	9
Nov.	0	4	0	4	4	6	0	5	T	11
Dec.	0	11	0	11	2	13	#	11	4	15
Yearly		68	34	68	122	98		90	100	165

## IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		El Centinela, Baja California		Delta, Baja California	
	2001	Average 1948-2001	2001	Average 1926-2001	2001	Average 1948-2001	2001	Average 1975-2001	2001	Average 1948-2001
Jan.	6	9	3	9	38	10	#	5	3	7
Feb.	1	5	13	8	38	6	#	7	22	7
Mar.	26	4	6	6	47	6	#	3	17	5
April	2	2	T	2	0	2	#	2	0	1
May	0	T	0	T	0	T	#	0	0	T
June	0	T	0	T	0	1	#	T	0	T
July	17	3	1	4	0	2	#	1	7	2
Aug.	6	8	T	9	0	5	#	4	T	6
Sept.	T	4	T	9	0	5	#	7	T	6
Oct.	3	6	1	8	0	6	#	5	1	7
Nov.	T	4	T	4	0	3	#	1	T	3
Dec.	T	9	T	17	0	7	#	7	T	10
Yearly	61	55	24	80	129	59		42	50	52

Month	San Felipe, Baja California		Riito, Sonora						
	2001	Average 1948-2001	2001	Average 1949-2001					
Jan.	0	6	T	6					
Feb.	38	5	30	6					
Mar.	0	3	46	5					
April	0	1	0	1					
May	0	1	0	T					
June	0	1	0	T					
July	0	3	0	2					
Aug.	0	9	5	6					
Sept.	0	17	0	9					
Oct.	95	8	0	8					
Nov.	0	5	0	4					
Dec.	0	9	0	10					
Yearly	133	73	81	60					

T Trace

# Missing Record

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 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 2001.

## IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	@ ELEV. (Meters)	RECORD BEGAN	OBSERVER
* Blythe, California	33° 37'	114° 36'	81.69	1909	State Division of Forestry
Brawley, California	32° 57'	115° 33'	30.48	1908	Agricultural Research Service
Bullhead City, Arizona	35° 07'	114° 36'	176.78	1980	Bullhead City Fire Department
El Centro, California	32° 46'	115° 34'	9.14	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32° 37'	114° 39'	58.22	1923	University of Arizona Experimental Farm

## IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	@ ELEV. (Meters)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32° 34'	115° 00'	**20.12	1948	# S. A. R. H.
Delta, Baja California	32° 21'	115° 11'	**11.89	1948	S. A. R. H.
El Centinela, Baja California	32° 35'	115° 45'	49.99	1978	S. A. R. H.
Los Algodones, Baja California	32° 42'	114° 44'	35.05	1948	S. A. R. H.
Mexicali, Baja California	32° 40'	115° 28'	3.96	1926	S. A. R. H.
Riito, Sonora	32° 13'	115° 01'	13.11	1959	S. A. R. H.
San Felipe, Baja California	31° 01'	114° 51'	21.95	1969	S. A. R. H.

\* Not shown on rainfall map

@ Elevation above mean sea level except Brawley and El Centro, which are elevations below mean sea level

\*\* Elevation obtained from International Boundary and Water Commission topographic maps

# Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE COLORADO RIVER BASIN  
IN MILLIMETERS

Tabulated below are records of evaporation observed at one station in Arizona, at five stations in Baja California, and at one station in Sonora. The station in the United States is operated by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Agriculture and Hydraulic Resources. The type of pan used at all these stations was the National Weather Service standard pan of 1.22 meters diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

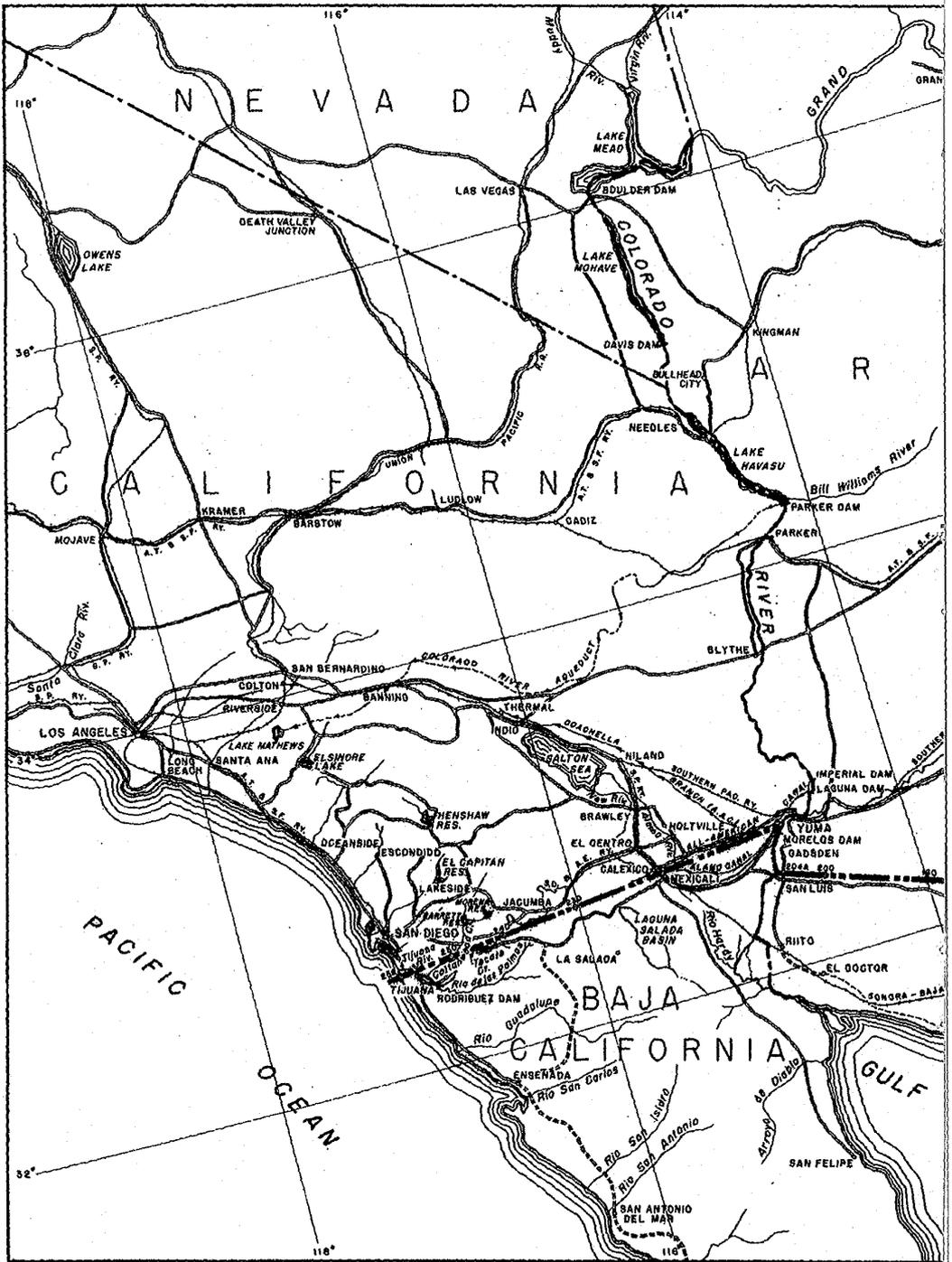
Month	Yuma Citrus Station, Arizona	
	2001	Average 1931-2001
Jan.	#	99
Feb.	#	120
Mar.	#	184
April	#	252
May	#	321
June	#	358
July	#	384
Aug.	#	336
Sept.	272	265
Oct.	#	189
Nov.	138	125
Dec.	#	94
Yearly		2,727

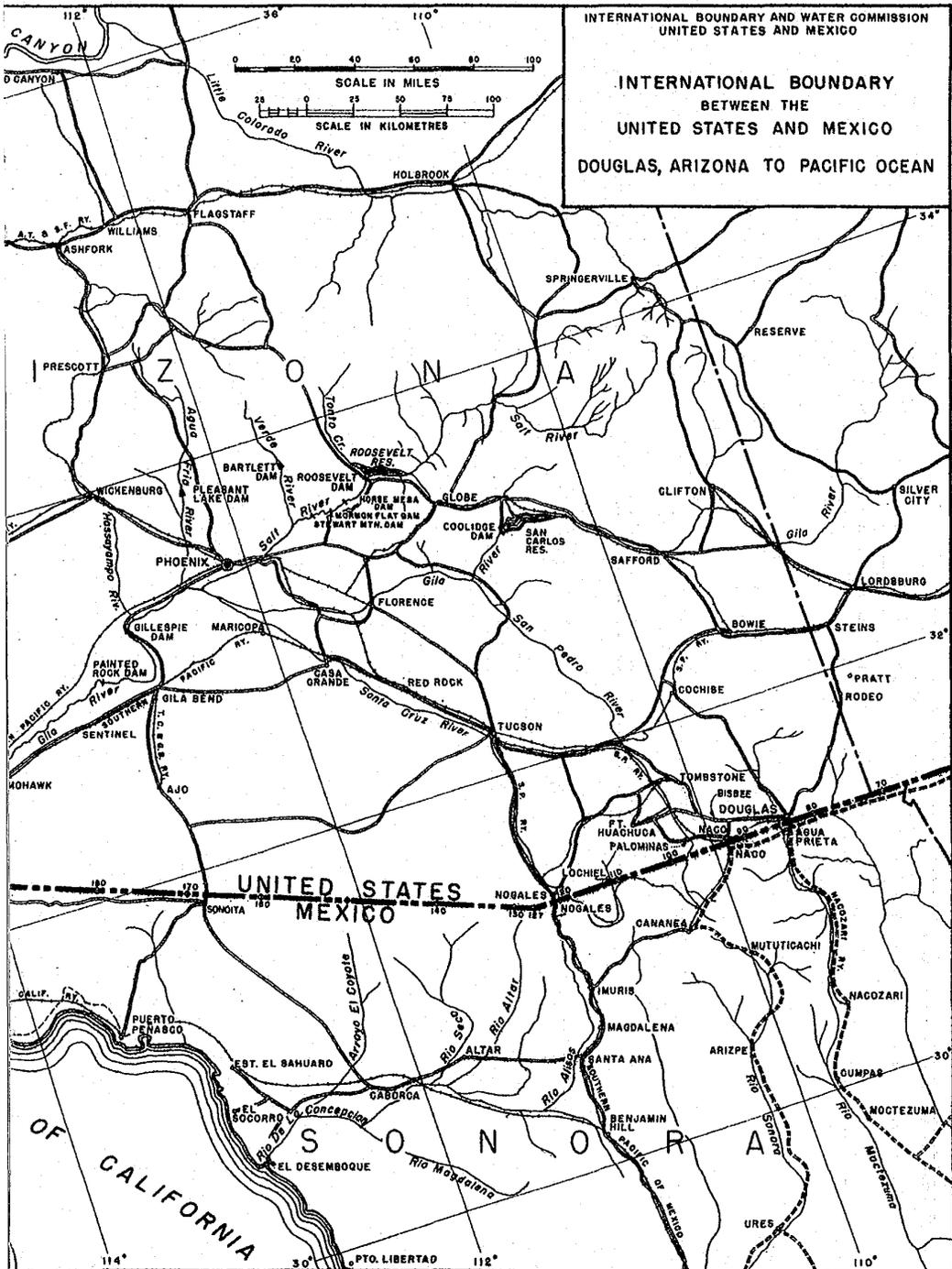
IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		Riito, Sonora		San Felipe, Baja California	
	2001	Average 1948-2001	2001	Average 1926-2001	2001	Average 1948-2001	2001	Average 1949-2001	2001	Average 1948-2001
Jan.	91	105	44	63	94	83	#	76	130	120
Feb.	111	127	67	129	120	102	#	98	149	139
Mar.	132	179	95	146	141	150	#	146	183	169
April	222	248	149	196	228	206	#	187	191	198
May	295	310	209	265	266	269	#	256	259	243
June	326	335	266	291	318	305	#	286	281	258
July	324	343	264	296	350	291	#	315	316	276
Aug.	286	306	226	255	312	255	#	266	310	263
Sept.	258	255	177	202	250	210	#	215	262	230
Oct.	165	200	115	145	167	149	#	153	185	199
Nov.	134	132	85	85	133	110	#	95	160	149
Dec.	87	106	50	60	133	80	#	77	133	120
Yearly	2,431	2,650	1,747	2,077	2,512	2,702		2,246	2,559	2,417

Month	Delta, Baja California								
	2001	Average 1948-2001							
Jan.	76	85							
Feb.	80	107							
Mar.	124	152							
April	177	209							
May	284	256							
June	324	281							
July	293	290							
Aug.	291	265							
Sept.	230	223							
Oct.	161	157							
Nov.	118	105							
Dec.	75	149							
Yearly	2,233	2,065							

# Missing record





INTERNATIONAL BOUNDARY AND WATER COMMISSION  
UNITED STATES AND MEXICO

**INTERNATIONAL BOUNDARY  
BETWEEN THE  
UNITED STATES AND MEXICO  
DOUGLAS, ARIZONA TO PACIFIC OCEAN**

TEMPERATURE IN THE COLORADO RIVER BASIN  
IN DEGREES CELSIUS

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located approximately one meter 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," in this bulletin.

IN THE UNITED STATES

Month	Blythe, California				Yuma Citrus Station, Arizona				Brawley, California			
	2001				2001				2001			
	Mean	Max.	Min.	Average 1931-01	Mean	Max.	Min.	Average 1931-01	Mean	Max.	Min.	Average 1931-01
Jan.	11.1	24.4	1.1	11.6	#	24.4	2.2	11.9	12.3	25.6	0.6	12.4
Feb.	13.0	27.8	0	14.2	#	24.4	1.1	14.1	29.4	29.4	1.1	14.7
Mar.	18.6	33.9	7.2	17.4	#	#	#	16.9	18.7	33.9	5.6	17.4
April	20.9	38.3	5.6	21.3	#	35.6	4.4	20.5	20.4	37.8	6.1	21.0
May	28.5	44.4	10.6	25.6	#	#	#	24.4	28.0	45.6	9.4	25.1
June	33.0	46.7	12.8	29.9	#	#	#	28.8	31.0	43.9	16.1	29.4
July	32.6	47.8	15.0	33.6	#	#	#	32.7	32.3	47.2	18.9	33.0
Aug.	33.7	46.7	14.4	32.9	#	31.7	17.8	32.5	33.1	45.6	18.9	33.0
Sept.	30.2	43.3	12.8	29.5	#	#	18.3	29.5	30.7	41.7	17.8	30.1
Oct.	22.9	37.2	5.0	22.9	#	#	#	23.1	25.4	37.8	12.2	23.9
Nov.	17.5	33.3	-2.8	15.7	18.9	31.7	2.8	16.4	19.6	31.7	6.1	17.0
Dec.	#	23.9	-1.1	11.7	#	#	#	12.4	11.4	25.0	-0.6	12.7
Yearly		47.8	0.0	22.2				21.9		47.2	-0.6	22.5

Month	El Centro, California				Bullhead City, Arizona							
	2001				2001							
	Mean	Max.	Min.	Average 1931-01	Mean	Max.	Min.	Average 1978-01				
Jan.	12.3	24.4	1.7	12.5	11.7	22.2	1.7	12.4				
Feb.	13.6	28.9	2.2	14.8	13.3	26.7	1.7	14.9				
Mar.	19.1	36.1	7.2	17.5	18.5	33.3	5.6	18.0				
April	20.4	37.2	7.2	21.0	21.7	38.9	5.0	22.3				
May	28.5	43.3	12.8	25.2	30.4	46.1	12.8	27.4				
June	31.4	43.9	17.2	29.6	33.8	47.8	17.8	32.4				
July	32.9	47.2	19.4	33.2	34.9	50.0	21.1	35.2				
Aug.	33.8	46.1	22.2	32.9	35.8	47.8	21.1	34.8				
Sept.	31.5	42.2	17.8	29.9	31.8	43.3	18.3	30.7				
Oct.	25.9	37.2	13.9	23.9	25.0	37.2	10.6	24.0				
Nov.		33.3	4.4	17.0	18.9	32.2	2.8	16.7				
Dec.	12.2	25.6	1.1	12.8	11.2	21.1	0.6	12.0				
Yearly		47.2	1.1	22.5	23.9	50.0	0.6	23.4				

IN MEXICO

Month	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	2001		1948-2001		2001		1926-2001		2001		1948-2001	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	26	2	31	-5	24	3	34	-7	24	10	45	-9
Feb.	29	2	35	-2	28	5	34	-5	28	8	37	-6
Mar.	35	6	38	0	33	7	38	-1	32	8	45	-4
April	38	5	43	3	38	9	41	1	38	10	48	-9
May	46	12	47	6	45	14	47	6	46	20	51	1
June	46	18	52	11	47	20	49	9	45	25	57	6
July	48	21	50	13	49	22	49	13	48	26	56	7
Aug.	46	22	49	16	47	21	49	12	46	28	54	8
Sept.	45	20	50	10	43	22	50	8	43	25	57	4
Oct.	39	14	44	0	39	15	44	0	39	18	48	0
Nov.	35	6	38	-3	31	6	40	-2	31	9	46	0
Dec.	23	2	32	-5	24	3	32	-5	24	6	36	-5
Yearly	48	2	52	-5	49	3	50	-7	48	6	57	-9

# Missing Data



## IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM

2001

The total drainage area within the Colorado River basin is about 637,000 square kilometers, of which 478,100 square kilometers lie above Imperial Dam and about 159,000 square kilometers, are below the dam. Of the area below Imperial Dam, 153,800 square kilometers are in the United States and about 5,180 square kilometers are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 150,700 square kilometers, of which about 2,850 square kilometers 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 U. S. Bureau of Reclamation; and 3) those within the Imperial Valley; California, the data for which are furnished by the U. S. Bureau of Reclamation. 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 Agriculture and 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 Hectares
<b>IN THE UNITED STATES:</b>	
Imperial Dam	
Yuma Valley Division	20,776
Reservation Division	5,350
Yuma Mesa	7,481
Yuma Aux. Project Unit "B" (Yuma Mesa)	1,078
South Gila Valley	3,970
North Gila Valley	2,544
Wellton-Mohawk	24,628
Coachella Valley	30,969
Imperial Valley	200,875
Warren Act	41
Non-Project lands adjacent to Colorado River	5,519
Total in United States	303,231
<b>IN MEXICO:</b>	
San Luis Valley, R. C., Sonora	15,311
Mexicali Valley	104,541
Total in Mexico	119,852
Total in United States and Mexico	423,083

10-2545.80 ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 11.3 kilometers east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and approximately three meters upstream from a 1.22-meter Cipolletti weir in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal. On November 18, 1992 continuous gage height recording equipment was installed at the site. RECORDS: From June 1942 through November 18, 1992 flows 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. A continuous gage height record and mean daily discharge records are available November 19, 1992 through 2001. Records obtained and furnished by Imperial Irrigation District.

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. On September 28, 1995 the National Water Commission of Mexico completed the construction of a weir immediately upstream of the international boundary. The result is that all the Alamo River flow, or a portion thereof, is being diverted into the New River via the interconnected agricultural drainage system in Mexico. After September 28, 1995 the recorded flow at the gage is affected by this diversion.

EXTREMES: Maximum mean daily discharge, 7.31 CMS (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949 and numerous days after September 28, 1995. 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 CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.12	0.10	0.12	0.09	0.08	0.07	0.07	0.07	0.06	0.01	0.01	0.02
2	.13	.10	.12	.09	.08	.07	.07	.06	.06	.01	.01	.02
3	.10	.10	.11	.10	.08	.07	.07	.06	.06	0	.01	.01
4	.10	.10	.10	.10	.08	.07	.07	.06	.06	.01	.01	.01
5	.10	.09	.10	.10	.08	.07	.08	.07	.07	.01	.01	.01
6	.10	.09	.10	.10	.08	.07	.08	.07	.08	.01	.01	.02
7	.10	.09	.10	.10	.08	.07	.08	.06	.07	.01	.01	.02
8	.11	.09	.09	.10	.08	.07	.09	.06	.06	.01	.01	.02
9	.11	.09	.09	.09	.08	.07	.10	.06	.06	.01	.01	.02
10	.11	.10	.09	.09	.08	.07	.09	.06	.06	.01	.01	.02
11	.11	.10	.10	.09	.08	.07	.08	.06	.06	.01	.01	.02
12	.12	.11	.10	.09	.09	.07	.08	.05	.06	.01	.01	.02
13	.13	.11	.10	.09	.09	.07	.08	.05	.06	.01	.01	.02
14	.12	.11	.10	.08	.08	.07	.08	.06	.06	.01	.01	.02
15	.10	.11	.09	.08	.08	.07	.07	.06	.06	.01	.01	.02
16	.10	.11	.09	.08	.08	.06	.07	.06	.06	.01	.01	.02
17	.11	.11	.10	.08	.08	.06	.07	.06	.06	.01	.01	.02
18	.11	.10	.10	.08	.08	.06	.07	.06	.06	.01	.02	.02
19	.10	.10	.12	.08	.08	.06	.07	.06	.03	.01	.02	.02
20	.10	.10	.12	.08	.07	.06	.07	.06	0	.01	.02	.02
21	.10	.10	.11	.08	.07	.06	.08	.06	0	.01	.02	.02
22	.10	.10	.11	.08	.07	.07	.07	.06	0	.01	.02	.02
23	.10	.10	.10	.08	.07	.07	.07	.06	0	.01	.01	.02
24	.10	.10	.10	.08	.07	.08	.06	.07	0	.01	.02	.02
25	.10	.11	.09	.08	.07	.08	.06	.06	0	.01	.02	.02
26	.13	.11	.09	.08	.07	.08	.06	.06	0	.01	.02	.02
27	.12	.12	.09	.09	.07	.07	.06	.06	0	.01	.02	.02
28	.11	.11	.09	.11	.07	.07	.06	.06	.01	.01	.02	.02
29	.14	.08	.08	.09	.07	.07	.07	.06	.01	.01	.04	.02
30	.12	.08	.08	.08	.07	.07	.07	.06	.01	.01	.03	.01
31	.11	.09	.09	.07	.07	.07	.07	.06	.01	.01	.04	.02
Sum	3.41	2.86	3.07	2.64	2.38	2.07	2.27	1.88	1.18	0.30	0.45	0.58

Current Year 2001

Period 1943-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.	0.200	0.155	29	0.14	13	0.10	295	329	3,441	0	
Feb.	.180	.150	27	.12	15	.09	247	302	3,481	0	
Mar.	.180	.145	1	.12	129	.08	265	343	3,890	0	
April	.170	.135	28	.11	144	.08	228	358	2,741	0	
May	.145	.130	112	.09	120	.07	206	295	2,219	0	
June	.145	.115	124	.08	116	.06	179	279	2,080	0	
July	.160	.115	9	.10	124	.06	196	264	2,112	72.8	
Aug.	.125	.105	1	.07	112	.05	162	302	2,062	81.0	
Sept.	.135	.010	6	.08	120	0	102	279	1,734	102	
Oct.	.035	.015	1	.01	3	0	.01	25.9	2,276	0	
Nov.	.080	.030	29	.04	1	.01	.02	38.9	2,566	6.0	
Dec.	.060	.045	1	.02	13	.01	.02	50.1	2,080	0	
Yearly	0.200	0.010		0.14		0	0.06	1,995	3,646	27,317	1,318

φ Mean daily

! And other days

## 10-2549.70 NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the left (west) bank of the river in the limits of the City of Calexico, California, 427 meters downstream (north) from 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 current meter measurements by the Imperial Irrigation District. Records computed and furnished by the District. Records available: June 1942 through 2001.

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) sewerage 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 43,172 TCM during any successive five-year period under the provisions of Minute No. 197 of the Commission. Gage heights shown are meters below mean sea level.

EXTREMES: Maximum mean daily discharge, 29.2 CMS on December 9, 1982; minimum mean daily discharge, 0.06 CMS 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 CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.64	7.42	13.5	7.22	6.80	4.70	4.73	4.50	4.76	4.50	9.23	3.96
2	5.64	6.71	13.9	6.94	7.45	4.76	4.90	4.45	4.90	4.39	6.71	3.94
3	6.37	6.37	12.4	6.97	7.59	4.81	5.15	4.93	5.01	4.33	4.87	3.94
4	6.03	6.37	10.1	6.97	7.16	4.98	5.07	5.07	4.98	4.36	4.53	4.05
5	6.03	6.43	8.69	6.77	6.83	4.93	4.98	4.81	5.18	4.39	4.64	4.11
6	6.03	6.40	8.95	6.49	6.51	5.15	5.64	4.87	5.21	4.13	4.62	4.02
7	5.86	6.32	8.38	6.49	6.23	5.10	5.55	4.98	4.90	4.05	4.59	3.88
8	6.00	6.37	8.33	6.32	6.15	4.98	5.52	5.38	4.79	5.01	4.56	4.05
9	6.43	6.17	8.24	6.97	6.26	4.79	5.61	5.44	4.76	5.07	4.56	4.11
10	6.63	5.95	7.79	6.66	6.26	4.64	5.95	5.24	4.96	4.67	4.56	4.19
11	6.37	5.95	7.93	6.83	6.03	4.53	6.20	5.04	4.96	4.47	4.50	4.39
12	6.49	6.00	7.90	6.77	5.72	4.62	6.00	4.98	5.01	4.36	4.36	4.33
13	6.68	6.40	7.65	6.60	5.32	4.56	5.69	5.24	4.87	4.25	4.50	4.13
14	7.33	6.74	7.99	6.26	5.24	4.62	5.47	5.47	4.73	4.36	4.59	4.16
15	9.09	6.60	7.73	6.20	5.21	4.53	5.27	5.72	4.76	4.73	4.56	4.45
16	10.2	6.43	7.50	6.43	5.01	4.64	5.44	5.69	4.73	4.84	4.87	4.76
17	8.18	6.12	7.39	7.08	4.93	4.67	5.64	5.32	4.84	4.70	4.76	4.90
18	6.91	6.12	7.28	7.31	5.07	4.62	5.44	4.98	4.96	4.39	4.19	5.32
19	6.54	6.54	6.97	6.57	5.10	4.67	5.21	4.96	4.62	3.40	4.11	5.58
20	6.40	7.25	7.08	6.32	4.96	4.73	4.84	4.81	4.29	5.81	4.16	5.61
21	6.26	7.36	7.42	6.15	5.01	4.76	4.79	4.93	3.99	4.42	4.16	5.58
22	6.80	6.71	7.00	7.02	5.04	4.84	4.59	5.83	4.16	4.33	4.11	5.61
23	6.37	6.20	7.22	7.70	5.55	4.93	4.33	5.75	4.22	3.99	3.96	5.61
24	6.85	5.86	7.28	7.73	5.64	4.81	4.42	5.15	4.30	3.46	4.22	5.58
25	6.88	6.34	7.28	7.56	5.15	4.70	4.45	5.04	4.47	4.84	3.96	5.52
26	6.51	7.76	6.60	7.65	5.07	4.73	4.36	4.64	4.64	7.93	3.88	6.17
27	6.80	9.66	7.36	7.42	4.76	5.21	4.45	4.56	4.64	4.30	3.99	7.02
28	7.14	11.9	7.48	7.14	4.73	5.35	4.50	4.79	4.79	3.46	3.99	6.63
29	7.84		7.45	7.28	5.01	5.07	4.42	4.90	4.64	3.46	3.91	6.34
30	8.84		7.16	7.16	5.01	5.07	4.33	4.84	4.36	3.48	3.85	5.55
31	8.41		7.25		4.76		4.30	4.73		6.94		5.24
Sum	213.75	190.45	255.20	206.98	175.56	144.50	157.24	157.04	141.33	140.82	137.70	152.73

Current Year 2001

Period 1943-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	φ High		Day		φ Low	Total	Average	Maximum	Minimum
				Day	φ							
Jan.	11.965	12.505	16	10.2	1	1	5.64	6.90	18,468	13,324	27,387	2,160
Feb.	11.795	12.475	28	11.9	24	24	5.86	6.80	16,455	11,937	26,416	1,552
Mar.	11.430	12.360	2	13.9	26	26	6.60	8.23	22,049	13,704	31,213	1,243
April	12.245	12.440	24	7.73	21	21	6.15	5.66	17,885	15,759	34,066	1,715
May	12.265	12.625	3	-7.59	28	28	4.73	5.66	15,168	12,593	29,740	776
June	12.545	12.655	28	5.35	111	111	4.53	4.82	12,485	10,567	25,024	1,341
July	12.435	12.690	11	6.20	31	31	4.30	5.07	13,586	11,003	28,368	1,008
Aug.	12.485	12.665	22	5.83	2	2	4.45	5.07	13,568	12,521	34,066	1,405
Sept.	12.560	12.735	6	5.21	21	21	3.99	4.71	12,211	11,713	29,251	2,214
Oct.	12.170	12.825	26	7.93	19	19	3.40	4.54	12,167	11,589	28,072	2,567
Nov.	11.975	12.760	1	9.23	30	30	3.85	4.59	11,897	10,981	25,310	3,063
Dec.	12.295	12.755	27	7.02	7	7	3.88	4.93	13,196	12,960	28,104	2,175
Yearly	11.430	12.825		13.9			3.40	5.68	179,133	146,611	330,444	30,310

φ Mean daily

! And other days

10-2549.60 WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

DESCRIPTION: A 3.5-meter Parshall flume, installed by the State Commission of Public Services of Mexicali, is located 2.0 kilometers upstream of the pumping plant on the supply canal. Excess water discharges into an open channel, thence into a 91 centimeter diameter pipe that empties into Rivera Drain (Drain 134), which is 2.0 kilometers below the plant and 2.0 kilometers south of the international boundary. From this point the waste is carried by a closed concrete box conduit into New River.

RECORDS: During 2001 the mean daily flows were computed from the total inflow to the potable water plant as measured at the Parshall flume, less the water pumped to the city and the water used in the maintenance of the plant. The records are obtained and furnished by the State Commission of Public Services of Mexicali. Records available: January 1968 through December 2001.

REMARKS: The plant began operation on September 28, 1963 by the State Commission of Public Services of Mexicali. Before 1968 the flow was small and infrequent. The potable water plant obtains water from the West Main Canal, which is a part of Mexico's system of canals in the Colorado Irrigation System. Excess water discharges into a closed conduit that empties into New River 1.4 kilometers upstream of the international boundary.

EXTREMES: Maximum instantaneous discharge, 2.32 CMS on March 26, 1969; minimum instantaneous discharge, zero during several days in the years 1977 through 2001.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.02	0.04	0.04	0.04	0.04	0.06	0.05	0.04	0.05	0.04	0.04	0.03
2	.03	.05	.04	.03	.04	.04	.06	.06	.03	.03	.03	.02
3	.02	.02	.03	.04	.04	.04	.07	.05	.05	.03	.03	.02
4	.04	.03	.03	.04	.04	.06	.07	.05	.05	.03	.03	.02
5	.04	.03	.03	.05	.05	.05	.06	.03	.05	.05	.04	.02
6	.03	.03	.02	.06	.05	.07	.05	.05	.06	.04	.03	.02
7	.03	.03	.03	.03	.04	.04	.05	.05	.06	.03	.03	.02
8	.02	.04	.04	.04	.04	.06	.03	.05	.05	.05	.03	.02
9	.02	.03	.05	.03	.06	.05	.07	.05	.03	.03	.02	.02
10	.03	.03	.03	.06	.06	.03	.06	.06	.05	.03	.04	.02
11	.04	.02	.02	.03	.04	.05	.05	.05	.05	.05	.03	.03
12	.04	.03	.04	.04	.04	.05	.07	.03	.05	.03	.03	.02
13	.03	.03	.04	.05	.04	.07	.05	.05	.04	.04	.04	.01
14	.04	.03	.03	.02	.05	.04	.05	.05	.05	.04	.03	.02
15	.03	.03	.04	.03	.07	.06	.04	.05	.04	.04	.03	.01
16	.03	.04	.05	.03	.05	.04	.07	.05	.03	.03	.02	.01
17	.03	.04	.03	.03	.04	.04	.06	.05	.04	.03	.04	0
18	.04	.03	.02	.05	.07	.08	.06	.05	.03	.04	.03	.01
19	.04	.04	.04	.05	.05	.05	.06	.02	.04	.05	.03	.02
20	.04	.03	.05	.03	.06	.07	.06	.05	.03	.04	.03	.01
21	.04	.03	.02	.03	.06	.07	.06	.05	.05	.04	.03	0
22	.04	.03	.04	.03	.05	.06	.03	.05	.03	.03	.03	.02
23	.04	.04	.04	.04	.05	.07	.06	.05	.03	.04	.03	.02
24	.04	.02	.03	.05	.07	.05	.05	.05	.04	.03	.03	0
25	.05	.03	.04	.04	.05	.08	.05	.05	.03	.03	.02	.02
26	.03	.03	.05	.04	.07	.07	.05	.03	.05	.04	.02	.01
27	.04	.04	.03	.05	.05	.07	.05	.05	.03	.03	.02	.01
28	.05	.04	.04	.04	.06	.07	.04	.05	.04	.02	.02	.01
29	.03		.04	.04	.04	.07	.03	.06	.04	.04	.02	.01
30	.03		.04	.06	.06	.06	.06	.05	.03	.03	.02	.02
31	.04		.05		.05		.05	.05		.03		.02
Sum	1.07	0.91	1.12	1.20	1.58	1.72	1.67	1.48	1.25	1.11	0.87	0.49

Current Year 2001

Period 1968-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High		φ Low		Total	Average	Maximum	Minimum
				Day	φ						
Jan.			25	0.05	! 1	0.02	0.03	92.4	145	641	0
Feb.			2	.05	! 3	.02	.03	78.6	98.5	384	0
Mar.			! 9	.05	6	.02	.04	96.8	179	1,074	0
April			! 6	.06	14	.02	.04	104	173	532	0
May			15	.07	! 1	.04	.05	137	188	537	53.6
June			!18	.08	10	.03	.06	149	176	504	25.9
July			! 3	.07	8	.03	.05	144	210	651	0
Aug.			! 2	.06	19	.02	.05	128	227	735	39.7
Sept.			! 6	.06	2	.03	.04	108	213	677	44.1
Oct.			! 5	.05	28	.02	.04	95.9	199	625	46.7
Nov.			! 1	.04	! 9	.02	.03	75.2	175	622	32.8
Dec.			! 1	.03	!17	0	.02	42.3	162	737	8.6
Yearly				0.08		0	0.04	1,251	2,145	6,610	550

φ Mean daily ! And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

10-2549.65 WASTE WATERS FROM MEXICAN SYSTEM OF CANALS  
ENTERING THE UNITED STATES

DESCRIPTION: During 2001 the flow to the New River in Mexico included waste from the City of Mexicali Potable Water Plant, which discharges into Rivera Drain and then to New River, and drainage water coming from the Colorado River District system of canals that enter the New River below Laguna Xochimilco, and starting January 1988, the north irrigation district watershed is included.

RECORDS: Records of the Potable Water Plant are based on flows measured on a Parshall flume less pumping to the city. Records obtained and furnished by the State Commission of Public Services of Mexicali. Records available: Wisteria Wasteway, January 1951 through 1975; Sifon Wasteway, January 1952 to April 30, 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through December 2001.

REMARKS: To obtain data for Sifon and Pueblo Nuevo Wasteways, see bulletins 1 to 6 (1960-1965); and for Wisteria Wasteway, bulletins 1 to 16 (1960-1975). For data on wastes from Potable Water Plant, see previous page of this bulletin.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1956 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	287	990	10,803	7.8
February	232	817	8,981	7.8
March	2,047	733	5,506	26.8
April	126	597	3,940	19.9
May	136	424	3,174	11.2
June	149	429	6,994	0
July	167	651	12,644	0
August	178	656	5,103	0
September	108	502	3,966	25.9
October	95.9	629	4,285	10.4
November	75.2	630	4,668	0
December	262	752	10,720	0
Yearly	4,363	7,809	34,953	492

10-2540.05 SALTON SEA - ELEVATIONS OF WATER SURFACE

DESCRIPTION: Water-stage recorder and staff gage located on the western shore of the Salton Sea, 24.9 kilometers northwest of Westmorland, Imperial County, California. The Salton Sea is the sink of a closed basin which has a drainage area of 21,652 square kilometers. Zero of the gage is 76.200 meters below mean sea level, U. S. C. & G. S. datum.

RECORDS: Records of water surface elevations available from November 1904 through 2001. From January 1925 to October 22, 1951, once monthly records of elevations were collected by Imperial Irrigation District from a bench mark at Figure John's Spring, about 35.4 kilometers 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 new gaging station published as "Salton Sea near Westmorland, California." The elevation of the old station is at a datum of 0.305 meter higher than that of the present station. All records reported below and the area and capacity table are adjusted to the datum of the present station.

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 and New River channels. The bottom of the sea is 84.64 meters below mean sea level, U. S. C. & G. S. datum.

EXTREMES: Maximum elevation during 2001 was 69.310 meters below mean sea level. Minimum elevation during 2001 was 69.645 meters below mean sea level. Extremes for period of record: maximum elevation 59.710 below mean sea level February 10 to March 29, 1907; minimum elevation since 1906, 76.690 meters below mean sea level in November 1924.

MEAN DAILY WATER SURFACE ELEVATION IN METERS BELOW MEAN SEA LEVEL- 2001

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	69.555	69.495	69.435	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.615	69.615
2	69.555	69.495	69.435	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.615	69.615
3	69.555	69.495	69.435	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.585	69.615
4	69.555	69.495	69.405	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.585	69.615
5	69.555	69.495	69.405	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.585	69.615
6	69.555	69.495	69.405	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.585	69.615
7	69.555	69.495	69.405	69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.585	69.615
8	69.555	69.495	69.405	69.340	69.310	69.310	69.370	69.435	69.525	69.585	69.585	69.615
9	69.555	69.495	69.405	69.370	69.310	69.310	69.370	69.435	69.525	69.585	69.585	69.615
10	69.555	69.495	69.405	69.370	69.310	69.310	69.370	69.435	69.525	69.585	69.585	69.615
11	69.555	69.495	69.405	69.370	69.310	69.310	69.370	69.435	69.525	69.585	69.585	69.615
12	69.525	69.495	69.405	69.370	69.310	69.310	69.370	69.435	69.525	69.585	69.585	69.615
13	69.525	69.495	69.405	69.370	69.310	69.340	69.370	69.435	69.555	69.585	69.585	69.615
14	69.525	69.495	69.405	69.370	69.310	69.340	69.370	69.435	69.555	69.585	69.585	69.615
15	69.525	69.495	69.405	69.370	69.310	69.340	69.405	69.465	69.555	69.585	69.585	69.615
16	69.525	69.465	69.370	69.370	69.310	69.340	69.405	69.465	69.555	69.585	69.585	69.615
17	69.525	69.465	69.370	69.340	69.310	69.340	69.405	69.465	69.555	69.585	69.585	69.615
18	69.525	69.465	69.370	69.340	69.310	69.340	69.405	69.465	69.555	69.585	69.585	69.615
19	69.525	69.465	69.370	69.340	69.310	69.340	69.405	69.465	69.555	69.585	69.585	69.615
20	69.525	69.465	69.370	69.340	69.310	69.340	69.405	69.465	69.555	69.615	69.585	69.615
21	69.525	69.465	69.370	69.340	69.310	69.340	69.435	69.495	69.555	69.615	69.585	69.645
22	69.525	69.465	69.370	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.585	69.645
23	69.525	69.465	69.370	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
24	69.525	69.465	69.370	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
25	69.525	69.435	69.370	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
26	69.525	69.435	69.340	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
27	69.525	69.435	69.340	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
28	69.495	69.435	69.340	69.340	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
29	69.495		69.340	69.310	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
30	69.495		69.340	69.310	69.310	69.370	69.435	69.495	69.555	69.615	69.615	69.615
31	69.495		69.340	69.310	69.310	69.370	69.435	69.525	69.555	69.615	69.615	69.615
Avg.	69.530	69.475	69.385	69.345	69.310	69.335	69.400	69.465	69.545	69.590	69.595	69.615

Month	Current Year 2001		Period 1935-2001		
	a Extreme Elevation Meters		Elevation Meters		
	High	Low	# Average	# Maximum	! Minimum
Jan.	69.495	69.555	71.375	69.280	75.990
Feb.	69.435	69.495	71.280	69.190	75.830
Mar.	69.340	69.435	71.200	69.130	75.770
April	69.310	69.370	71.145	69.100	75.800
May	69.310	69.310	71.135	69.100	75.740
June	69.310	69.370	71.180	69.160	75.830
July	69.370	69.435	71.235	69.220	75.930
Aug.	69.435	69.525	71.290	69.250	76.020
Sept.	69.525	69.555	71.350	69.280	76.020
Oct.	69.555	69.615	71.380	69.310	76.140
Nov.	69.585	69.615	71.395	69.340	76.200
Dec.	69.615	69.645	71.360	69.340	76.080
Yearly	69.310	69.645	71.275	69.100	76.200

Area and Capacity Table		
Elevation	Area	Capacity
Meters Below M.S.L.	Hectares	Million Cubic Meters
84.640	0	0
83.520	8,337	31.7
82.300	25,455	232.8
81.080	38,284	629.8
79.250	49,615	1,443.2
78.030	54,512	2,077.2
76.810	60,218	2,775.3
74.370	72,723	4,393.7
73.150	79,683	5,322.5
71.630	89,760	6,611.5
70.100	95,426	8,022.6
67.060	106,029	11,092.7
64.010	116,753	14,481.1
60.960	127,680	18,206.2

a Mean daily

! Reading near first day of month

# Mean monthly

## CHEMICAL ANALYSIS OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the California Regional Water Quality Control Board - Colorado River Basin, Region-7. New River Samples prior to 1985 were collected and analyzed by the U.S. Geological Survey. Samples from the New River are taken from the right bank at the road bridge, 137 meters north of the international boundary.

## NEW RIVER AT INTERNATIONAL BOUNDARY

2001 Date	Time Std.	*Streamflow Momentary CMS	Water Temperature Deg C	pH Units	Oxygen Dissolved (DO) mg/L	Specific Conductance Microsiemens/cm	Turbidity NTU
Jan. 21	0700	6.26	13.0	7.6	4.5	3,650	18.2
Feb. 19	0700	6.54	15.7	7.3	2.9	3,940	9.8
Mar. 27	0700	7.36	22.2	7.1	0.6	4,750	14.0
Apr. 21	0900	6.15	21.6	7.7	1.5	3,710	N.A.
May 21	0700	5.01	27.9	7.8	0.8	4,400	30.0
July 2	0700	4.90	31.4	7.7	2.1	5,130	42.0
July 30	0700	4.33	29.0	8.0	0.0	4,480	29.1
Aug. 22	0800	5.83	28.1	7.7	0.7	4,320	25.4
Sept. 25	0700	4.47	28.1	7.7	2.1	4,040	26.4
Oct. 29	0700	3.46	23.3	8.0	1.6	2,790	52.5
Nov. 27	0700	3.99	15.1	7.8	1.6	4,560	24.7
Dec. 18	0700	5.32	9.7	7.8	2.1	2,950	6.0

\* Flow provided by the Imperial Irrigation District (Mean Daily)  
N.A. - Not Analyzed

## NEW RIVER AT INTERNATIONAL BOUNDARY

SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	
DATE	Jan. 21, 2001	Feb. 19, 2001	Mar. 27, 2001	Apr. 21, 2001	
PARAMETER	CONCENTRATION	CONCENTRATION	CONCENTRATION	CONCENTRATION	DETECTION LIMIT
Arsenic	3.00 ug/L	3.00 ug/L	12.00 ug/L	5.00 ug/L	2.0 ug/L
Boron	N.A.	N.A.	N.A.	N.A.	0.1 mg/L
Cadmium	N.D.	N.D.	N.D.	N.D.	1.0 ug/L
Chromium	N.D.	14.0 ug/L	N.D.	N.D.	10.0 ug/L
Copper	13.0 ug/L	66.0 ug/L	30.0 ug/L	173.0 ug/L	10.0 ug/L
Lead	N.D.	N.D.	N.D.	24.0 ug/L	10.0 ug/L
Phenol	0.009mg/L	0.005 mg/L	N.D.	N.A.	0.002 mg/L
MBAS	3.62 mg/L	0.250 mg/L	0.320 mg/L	1.68 mg/L	0.025 mg/L
Zinc	115 ug/L	92.0 ug/L	61.0 ug/L	380.0 ug/L	50.0 ug/L
Total Cyanide	N.D.	N.D.	N.D.	N.A.	0.01 mg/L
Total Phosphate(P04-P)	2.34 mg/L	1.48 mg/L	2.66 mg/L	1.54 mg/L	0.01 mg/L
Nitrate (NO3-N)	0.50 mg/L	1.70 mg/L	1.59 mg/L	0.10 mg/L	0.20 mg/L
Nitrite (NO2-N)	0.10 mg/L	0.16 mg/L	0.09 mg/L	0.06 mg/L	0.03 mg/L
Ammonia (NH3-NH4-N)	7.30 mg/L	5.53 mg/L	6.39 mg/L	2.92 mg/L	0.05 mg/L
Total Dissolved Solids	2,410 mg/L	2,670 mg/L	2,910 mg/L	N.A.	10.0 mg/L
Total Suspended Solids	54.0 mg/L	50.5 mg/L	52.6 mg/L	N.A.	10.0 mg/L
Volatile Suspended Solids	N.A.	N.A.	N.A.	N.A.	

SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	
DATE	May 21, 2001	July 2, 2001	July 30, 2001	Aug. 22, 2001	
PARAMETER	CONCENTRATION	CONCENTRATION	CONCENTRATION	CONCENTRATION	DETECTION LIMIT
Arsenic	5.00 ug/L	N.D.	N.D.	5.00 ug/L	2.0 ug/L
Boron	N.A.	N.A.	N.A.	N.A.	0.1 mg/L
Cadmium	N.D.	N.D.	N.D.	N.D.	1.0 ug/L
Chromium	N.D.	N.D.	N.D.	N.D.	10.0 ug/L
Copper	N.D.	N.D.	26.0 ug/L	86.0 ug/L	10.0 ug/L
Lead	N.D.	N.D.	N.D.	N.D.	10.0 ug/L
Phenol	N.D.	N.D.	N.D.	N.D.	0.002 mg/L
MBAS	0.374mg/L	1.140 mg/L	0.057 mg/L	0.065 mg/L	0.025 mg/L
Zinc	74.0 ug/L	99.0 ug/L	72.0 ug/L	126 ug/L	50.0 ug/L
Total Cyanide	N.D.	N.D.	N.D.	N.D.	0.01 mg/L
Total Phosphate(P04-P)	2.09 mg/L	1.82 mg/L	2.20 mg/L	1.97 mg/L	0.01 mg/L
Nitrate (NO3-N)	N.D.	N.D.	N.D.	N.D.	0.20 mg/L
Nitrite (NO2-N)	N.D.	N.D.	0.16 mg/L	N.D.	0.03 mg/L
Ammonia (NH3-NH4-N)	7.52 mg/L	0.57 mg/L	8.00 mg/L	4.60 mg/L	0.05 mg/L
Total Dissolved Solids	2,990 mg/L	2,830 mg/L	2,510 mg/L	2,530 mg/L	10.0 mg/L
Total Suspended Solids	67.6 mg/L	46.0 mg/L	86.0 mg/L	61.0 mg/L	10.0 mg/L
Volatile Suspended Solids	N.A.	N.A.	N.A.	N.A.	

N.A. - Not Analyzed  
N.D. - Not Detected

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## CHEMICAL ANALYSIS OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the California Regional Water Quality Control Board - Colorado River Basin, Region-7. New River Samples prior to 1985 were collected and analyzed by the U.S. Geological Survey. Samples from the New River are taken from the right bank at the road bridge, 137 meters north of the international boundary.

## NEW RIVER AT INTERNATIONAL BOUNDARY

SAMPLE TYPE	COMPOSITE	COMPOSITE	COMPOSITE	COMPOSITE	
DATE	Sep. 25, 2001	Oct. 29, 2001	Nov. 27, 2001	Dec. 18, 2001	
PARAMETER	CONCENTRATION	CONCENTRATION	CONCENTRATION	CONCENTRATION	DETECTION LIMIT
Arsenic	6.00 ug/L	5.00 ug/L	5.00 ug/L	3.00 ug/L	2.0 ug/L
Boron	N.A.	N.A.	N.A.	N.A.	0.1 mg/L
Cadmium	N.D.	N.D.	N.D.	N.D.	1.0 ug/L
Chromium	N.D.	N.D.	N.D.	N.D.	10.0 ug/L
Copper	N.D.	N.D.	N.D.	56.0 ug/L	10.0 ug/L
Lead	N.D.	N.D.	N.D.	N.D.	10.0 ug/L
Phenol	N.D.	0.013 mg/L	0.010 mg/L	N.D.	0.002 mg/L
MBAS	2.074mg/L	10.74 mg/L	0.210 mg/L	0.370 mg/L	0.025 mg/L
Zinc	198.0 ug/L	96.0 ug/L	N.D.	212 ug/L	50.0 ug/L
Total Cyanide	0.01 mg/L	0.01 mg/L	0.01 mg/L	N.D.	0.01 mg/L
Total Phosphate(PO <sub>4</sub> -P)	1.90 mg/L	5.37 mg/L	2.01 mg/L	2.18 mg/L	0.01 mg/L
Nitrate (NO <sub>3</sub> -N)	N.D.	0.10 mg/L	N.A.	0.30 mg/L	0.20 mg/L
Nitrite (NO <sub>2</sub> -N)	0.11 mg/L	N.D.	N.A.	0.05 mg/L	0.03 mg/L
Ammonia (NH <sub>3</sub> -NH <sub>4</sub> -N)	6.67 mg/L	19.50 mg/L	12.30 mg/L	7.74 mg/L	0.05 mg/L
Total Dissolved Solids	2,470 mg/L	1,640 mg/L	2,750 mg/L	2,480 mg/L	10.0 mg/L
Total Suspended Solids	46.0 mg/L	N.D.	20.0 mg/L	32.0 mg/L	10.0 mg/L
Volatile Suspended Solids	N.A.	N.A.	N.A.	N.A.	

N.D.-- None Detected

N.A.-- Not Analyzed

## SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples from the New River in Mexico at the international boundary. Samples were taken by the Mexican Section of the Commission, who also made the determinations.

## NEW RIVER AT THE INTERNATIONAL BOUNDARY

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 2001

January		March		May		July		September		November	
15	4,400	12	4,900	7	5,100	6	5,000	3	4,400	5	3,200
22	4,600			14	4,500	7	4,200	4	3,900	19	3,900
				21	4,400	16	4,800			26	3,300
				28	4,100	23	4,300				
February		April		June		August		October		December	
6	4,100	16	4,800	4	6,200	13	4,800	8	3,700	3	4,400
12	4,500	23	4,100	11	5,800	27	4,300	15	4,000	10	3,300
19	4,100	30	4,900	18	5,100	28	3,900	29	4,200	17	4,400
26	4,200			25	4,400						

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## CHEMICAL ANALYSES OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the United States Section of the Commission.

Samples from the Alamo River are taken north of the international boundary upstream of the box culvert under the All-American Canal. Flow at this point includes drainage flows across the international boundary and flows from drain interceptors along the toe of the south bank of the All-American Canal. Samples from the New River are taken from the right bank at the road bridge, 137 meters north of the international boundary. Records of the sampling extend from April 1951 through 2001.

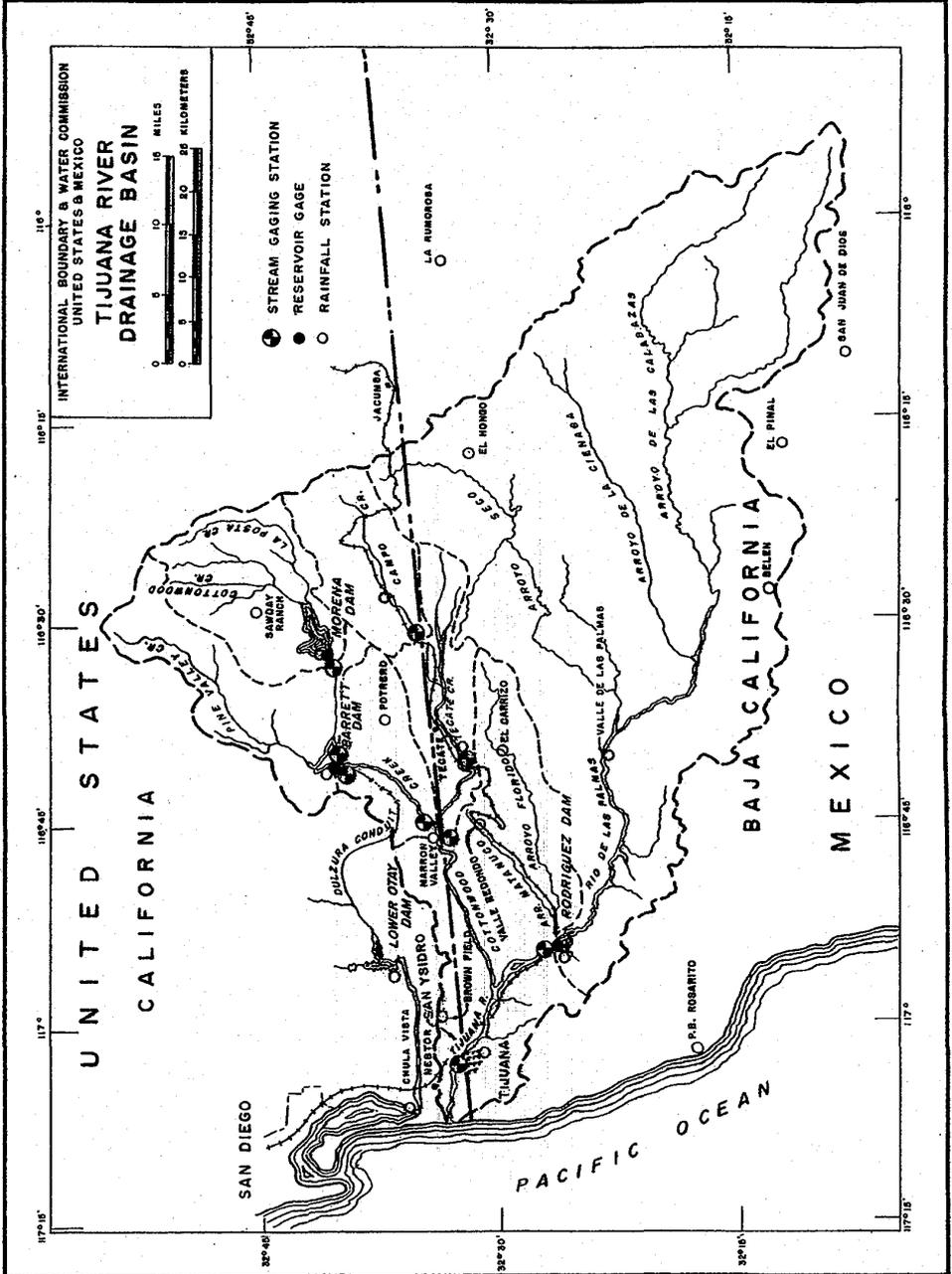
## ALAMO RIVER

2001 Date	Time Std.	Water Temperature Deg C	pH Units	Oxygen Dissolved (DO) mg/L	Conductance Micro- siemens/cm	Coliform Fecal Colonies/ 100 mL	Flow CMS
Jan. 24	0755	11.2	8.0	10.6	3,850	400	0.06
Feb. 21	0820	14.3	7.8	8.5	4,460	1,870	0.07
Mar. 28	0755	20.7	7.6	5.8	4,930	330	0.07
Apr. 25	0745	20.6	7.8	6.2	5,630	200	0.04
May 23	0755	26.4	7.6	4.2	5,270	133	0.08
June 27	0740	26.0	7.4	3.2	5,810	90	0.07
July 25	0730	26.7	7.2	0.2	6,020	133	0.07
Aug. 22	0745	27.2	7.5	1.3	5,480	400	0.03
Sep. 26	1125	26.2	7.5	3.2	5,470	170	0.03
Oct. 24	0945	22.1	7.1	3.8	4,950	300	0.03
Nov. 28	0730	14.5	7.9	8.1	4,810	100	0.07
Dec. 27	0830	9.5	7.8	8.8	4,660	530	0.06

## NEW RIVER

2001 Date	Time Std.	**Streamflow Momentary CMS	Water Temperature Deg C	pH Units	Oxygen Dissolved (DO) mg/L	Specific Conductance Microsiemens/cm	Fecal Coliform Colonies/ 100 mL
Jan. 10	0800	6.88	13.3	7.7	2.9	4,250	975,000
Jan. 24	0830	6.88	13.6	7.7	1.8	4,150	1,050,000
Feb. 7	0745	6.51	15.5	7.6	0.8	4,460	1,850,000
Feb. 21	0905	8.95	16.3	7.6	2.5	4,300	420,000
Mar. 7	0800	9.66	17.0	7.5	2.2	3,970	760,000
Mar. 28	0730	8.01	22.3	7.5	0.8	4,640	725,000
Apr. 11	0815	7.25	16.2	7.4	2.0	5,040	640,000
Apr. 25	0820	8.07	23.0	7.5	0.7	4,790	905,000
May 9	0715	6.46	27.0	7.5	0.4	4,750	1,500,000
May 23	0825	5.04	28.4	7.5	0.2	5,020	1,300,000
June 13	0745	4.33	25.4	7.7	0.2	4,950	2,300,000
June 27	0830	5.30	27.0	7.4	0.6	5,150	2,500,000
July 11	0750	6.46	28.8	7.4	0.5	4,700	1,625,000
July 25	0805	4.33	27.8	7.4	0.1	4,840	2,275,000
Aug. 8	0745	5.04	31.7	7.5	0.0	4,580	1,200,000
Aug. 22	0830	5.10	28.0	7.6	0.1	4,380	2,900,000
Sept. 26	0830	4.47	28.1	7.6	0.1	4,030	1,650,000
Oct. 10	0800	4.56	24.5	7.9	1.1	4,080	1,400,000
Oct. 24	1030	2.83	23.9	7.3	0.1	2,960	3,675,000
Nov. 8	0805	4.62	22.2	7.9	0.8	4,020	1,150,000
Nov. 28	0815	3.74	13.6	7.8	1.9	4,340	2,075,000
Dec. 12	0745	4.36	12.3	7.8	2.2	4,300	1,100,000
Dec. 27	0935	7.90	11.2	8.0	5.5	3,470	430,000

Note: Temperature, pH, D.O., and Specific Conductance - Data collected in the field  
 \*\* Flow reported by Imperial Irrigation District



## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 11-0100.00 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 2.9 kilometers upstream from the mouth of Hauser Creek, 13.7 kilometers upstream from Barrett Dam, and about 32.2 kilometers upstream from the international boundary. The zero of the gage is 878.555 meters 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 April 1911 through 2001.

**REMARKS:** Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 2001 computed on basis of area-capacity curves determined from 1948 resurvey. Various changes have been made to the spillway section since construction of the dam. Elevation of the present crest of ungated spillway is 47.855 meters, gage datum. Reservoir capacity at spillway crest, 1948 survey, is 61,934 TCM. 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:** Maximum monthly inflow since 1937, 55,845 TCM, March 1983. Prior to 1937, maximum monthly inflow, 45,886 TCM, January 1916; minimum no flow during parts of many years.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1937 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	175	1,205	20,362	0
February	188	2,580	41,407	9.9
March	472	3,494	55,845	23.8
April	797	2,052	28,530	4.1
May	1,192	1,030	18,642	0
June	768	584	10,173	0
July	860	363	7,651	0
August	345	275	8,916	0
September	197	190	6,331	0
October	128	165	4,817	0
November	112	272	5,633	0
December	76.2	736	9,472	5.4
Yearly	5,310	12,946	177,579	149

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 11-0105.00 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 1.3 kilometers 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 2001.

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: Maximum monthly discharge since 1937, 55,615 TCM, March 1983. Prior to 1937, maximum monthly discharge, 26,397 TCM February 1916; minimum, no flow during several months of various years.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1937 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	49.1	301	2,583	0
February	67.1	1,000	19,644	0
March	102	1,944	55,615	0
April	98.9	1,473	28,159	0
May	102	818	18,100	0
June	98.9	623	9,260	0
July	102	388	6,236	0
August	100	372	7,937	0
September	98.9	411	7,253	0
October	102	261	4,639	0
November	98.9	291	5,071	0
December	74.3	515	9,099	0
Yearly	1,094	8,397	168,432	0

## 11-0110.00 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 13.7 kilometers downstream from Morena Dam, 1.6 kilometers downstream from the mouth of Pine Valley Creek, and about 19.3 kilometers upstream from the international boundary. Zero of gage is 440.775 meters 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 2001. 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, California. Capacity of reservoir at top of flash gates on spillway (gage height 51.475 meters) is 55,205 TCM. Capacity at spillway crest (gage height 49.035 meters) is 46,811 TCM. Dead storage, 887 TCM below lowest outlet (gage height 17.945 meters) 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:** Maximum monthly discharge since 1937, 67,540 TCM, February 1980. Prior to 1937, maximum monthly discharge, 67,595 TCM February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1937 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	246	1,504	29,627	0
February	282	3,361	67,539	9.4
March	769	5,727	62,041	17.4
April	3,164	2,876	26,680	12.6
May	3,218	1,340	10,509	0
June	2,718	633	4,818	0
July	2,495	383	5,042	0
August	194	199	4,472	0
September	0	202	3,858	0
October	0	115	796	0
November	43.0	253	2,519	0
December	47.0	676	6,845	1.6
Yearly	13,176	17,269	141,024	159

11-0114.90 DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.8 kilometer downstream from Barrett Dam on right bank of Dulzura Conduit 15.2 meters 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 2001.

REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 2.4 kilometers 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 12.9 kilometers 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 loss in the reach from the reservoir to the gaging station.

EXTREMES: Since 1937: Maximum mean daily discharge, 4.66 CMS on March 8, 1995; minimum discharge, no flow for long periods on many occasions.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.94	0.92	0	0.68	0.77	0.58	0.51	0	0	0	0	0
2	.95	.93	0	.68	.77	.57	.52	0	0	0	0	0
3	1.08	.89	0	.68	.75	.50	.52	0	0	0	0	0
4	.99	.89	0	.68	.75	.50	.52	.37	0	0	0	0
5	.99	.88	0	.69	.78	.49	.53	.37	0	0	0	0
6	.97	.88	0	.69	.78	.49	.54	.37	0	0	0	0
7	.97	.89	.19	.71	.77	.49	.51	.40	0	0	0	0
8	.99	.89	0	.72	.78	.50	.52	.39	0	0	0	0
9	.99	.86	0	.71	.78	.51	.52	.42	0	0	0	0
10	.98	.82	.26	.74	.78	.49	.52	.39	0	0	0	0
11	0	.82	.42	.74	.78	.50	.52	.40	0	0	0	0
12	0	.80	.40	.97	.78	.48	.54	.39	0	0	0	0
13	0	.84	0	.73	.78	.48	.54	.39	0	0	0	0
14	.21	.22	0	.75	.79	.49	.52	.40	0	0	0	0
15	.57	.46	0	.75	.80	.49	.54	.37	0	0	0	0
16	.87	.46	.22	.75	.80	.49	.54	0	0	0	0	0
17	.99	.50	.62	.79	.80	.49	.52	0	0	0	0	0
18	.99	.75	.77	.75	.80	.50	.54	0	0	0	0	0
19	.97	.73	.75	.75	.79	.50	.52	0	0	0	0	0
20	.97	.75	.75	.75	.79	.50	.52	0	0	0	0	0
21	1.02	.73	.74	.75	.79	.50	.57	0	0	0	0	0
22	1.02	.73	.75	.78	.79	.50	.54	0	0	0	0	0
23	1.02	.73	.73	.77	.79	.50	.54	0	0	0	0	0
24	.99	.74	.71	.78	.79	.50	.56	0	0	0	0	0
25	.97	0	.70	.79	.25	.50	.54	0	0	0	0	0
26	.97	0	.70	.78	.46	.51	.54	0	0	0	0	0
27	.97	0	.69	.75	.46	.50	.54	0	0	0	0	0
28	.97	0	.68	.77	.64	.50	.54	0	0	0	0	0
29	.94	0	.69	.77	.57	.50	.54	0	0	0	0	0
30	.97	0	.68	.77	.57	.50	.54	0	0	0	0	0
31	.92	0	.68		.57		.54	0	0	0	0	0
Sum	26.16	18.11	12.13	22.42	22.30	15.05	16.50	4.66	0	0	0	0

Current Year 2001

Period 1937-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			3	1.08	!11	0	0.84	2,260	619	2,899	0
Feb.			2	.93	!25	0	.65	1,565	593	2,883	0
Mar.			18	.77	! 1	0	.39	1,048	861	7,639	0
April			12	.97	! 1	.68	.75	1,937	1,077	5,016	0
May			15	.80	25	.25	.72	1,927	1,217	3,750	0
June			1	.58	!12	.48	.50	1,300	1,250	4,611	0
July			22	.57	! 1	.51	.53	1,426	1,135	4,914	0
Aug.			9	.42	! 1	0	.15	403	1,058	4,741	0
Sept.			! 1	0	! 1	0	0	0	845	2,862	0
Oct.			! 1	0	! 1	0	0	0	726	3,235	0
Nov.			! 1	0	! 1	0	0	0	761	3,404	0
Dec.			! 1	0	! 1	0	0	0	661	2,843	0
Yearly				1.08		0	0.38	11,866	10,803	40,526	0

φ Mean daily

! And other days

## 11-0111.00 COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

**DESCRIPTION:** Water-stage recorder and cableway located about 4.0 kilometers downstream from Barrett Dam and 0.8 kilometer 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 305 meters (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. Spillway discharges have occurred in May 1943, March, April 1979, January to May of 1980, April, December 1982, and the entire year of 1983, January to April 1993 and January to March 1995. 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 2001. 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:** Maximum monthly discharge since 1937, 111,775 TCM March 1983. Prior to 1937, maximum monthly discharge 47,366 TCM February 1927; minimum, no flow during several months of various years.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1937 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	0.1	417	10,114	0
February	0.3	2,161	86,736	0
March	0.1	4,413	111,775	0
April	0.1	2,220	45,417	0
May	0.2	995	28,287	0
June	0.4	458	13,503	0
July	0.3	235	5,311	0
August	0.1	151	4,206	0
September	0.1	55.8	1,554	0
October	0.1	47.2	1,530	0
November	0.1	146	5,100	0
December	0.1	190	6,058	0
Yearly	2.0	11,489	254,099	0

11-0120.00 COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located 2.6 kilometers upstream from the international land boundary between the United States and Mexico, 1.3 kilometers upstream from the confluence with Tecate Creek, and 8.2 kilometers 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 213 meters downstream from the gage. Zero of the gage is 173.555 meters 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. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 2001.

REMARKS: Flow is largely controlled by Barrett and Morena Reservoirs, 16.1 kilometers and 29.0 kilometers, respectively, upstream from this station.

EXTREMES: Maximum discharge 331 CMS February 21, 1980 (gage height 3.400 meters). Minimum discharge, no flow during part of each year.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0.14	0.02	0	0	0	0	0	0	0	0
2	0	0	.11	.02	0	0	0	0	0	0	0	0
3	0	0	.08	.02	.01	0	0	0	0	0	0	0
4	0	0	.07	.02	.01	0	0	0	0	0	0	0
5	0	0	.06	.02	.01	0	0	0	0	0	0	0
6	0	0	.10	.02	.01	0	0	0	0	0	0	0
7	0	0	.11	.02	0	0	0	0	0	0	0	0
8	0	0	.11	.03	0	0	0	0	0	0	0	0
9	0	0	.11	.02	0	0	0	0	0	0	0	0
10	0	0	.20	.03	0	0	0	0	0	0	0	0
11	0	0	.23	.03	0	0	0	0	0	0	0	0
12	0	0	.16	.03	0	0	0	0	0	0	0	0
13	0	0	.12	.02	0	0	0	0	0	0	0	0
14	0	.01	.10	.02	0	0	0	0	0	0	0	0
15	0	0	.08	.02	0	0	0	0	0	0	0	0
16	0	0	.07	.02	0	0	0	0	0	0	0	0
17	0	0	.06	.02	0	0	0	0	0	0	0	0
18	0	0	.05	.02	0	0	0	0	0	0	0	0
19	0	0	.04	.02	0	0	0	0	0	0	0	0
20	0	0	.03	.02	0	0	0	0	0	0	0	0
21	0	0	.03	.03	0	0	0	0	0	0	0	0
22	0	0	.03	.03	0	0	0	0	0	0	0	0
23	0	.01	.02	.02	0	0	0	0	0	0	0	0
24	0	.01	.02	.01	0	0	0	0	0	0	0	0
25	0	.01	.02	.01	0	0	0	0	0	0	0	0
26	0	.03	.02	.01	0	0	0	0	0	0	0	0
27	0	.20	.02	.01	0	0	0	0	0	0	0	0
28	0	.22	.02	.01	0	0	0	0	0	0	0	0
29	0		.02	.01	0	0	0	0	0	0	0	0
30	0		.02	0	0	0	0	0	0	0	0	0
31	0		.02	0	0	0	0	0	0	0	0	0
Sum	0	0.49	2.27	0.58	0.04	0	0	0	0	0	0	0

Current Year 2001

Period 1937-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High		Day		Total	Average	Maximum	Minimum
				Day	φ Low						
Jan.			1	0	1	0	0				0
Feb.			28	.22	1	0	.02	42.3	1,396	45,897	0
Mar.			11	.23	123	.02	.07	196	3,540	85,134	0
April			8	.03	30	0	.02	50.1	5,228	109,418	0
May			3	.01	1	0	0	3.5	2,575	49,635	0
June			1	0	1	0	0	0	940	22,439	0
July			1	0	1	0	0	0	328	7,301	0
Aug.			1	0	1	0	0	0	105	3,599	0
Sept.			1	0	1	0	0	0	81.2	1,850	0
Oct.			1	0	1	0	0	0	79.2	4,209	0
Nov.			1	0	1	0	0	0	89.7	291	0
Dec.			1	0	1	0	0	0	54.1	1,378	0
Yearly				0.23		0	0.01	292	14,593	220,556	0

φ Mean daily      † And other days

11-0125.00 CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.8 kilometer upstream from the international land boundary between the United States and Mexico, just upstream from the bridge on California State Highway 94, 5.6 kilometers southwest of Campo, California. Zero of gage is 664.135 meters 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 from October 1956 through 2001.

REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station was partially regulated by a small conservation reservoir, 1.6 kilometers upstream, from August 1956 to February 20, 1980, when it was destroyed by a flood.

EXTREMES: Maximum discharge, 25.3 CMS, March 24, 1983 (gage height 1.640 meters present datum), from rating curve extended above 3.12 CMS 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 CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.01	0.02	0.01	0.01	0	0	0	0	0	0	0
2	0	.01	.01	.01	.01	0	0	0	0	0	0	0
3	0	.01	.01	.01	.01	0	0	0	0	0	0	0
4	0	.01	.01	.01	.01	0	0	0	0	0	0	0
5	0	.01	.01	.01	.01	0	0	0	0	0	0	0
6	0	.01	.03	.01	.01	0	0	0	0	0	0	0
7	0	.01	.10	.01	.01	0	0	0	0	0	0	0
8	.01	.01	.06	.01	.01	0	0	0	0	0	0	0
9	.01	.01	.03	.02	.01	0	0	0	0	0	0	0
10	.01	.01	.09	.02	.01	0	0	0	0	0	0	0
11	.01	.01	.10	.02	.01	0	0	0	0	0	0	0
12	.01	.01	.07	.02	.01	0	0	0	0	0	0	0
13	.01	.01	.04	.02	.01	0	0	0	0	0	0	0
14	.01	.01	.02	.01	.01	0	0	0	0	0	0	0
15	.01	.01	.02	.01	.01	0	0	0	0	0	0	0
16	.01	.01	.02	.01	.01	0	0	0	0	0	0	0
17	.01	.01	.02	.01	0	0	0	0	0	0	0	0
18	.01	.01	.02	.01	0	0	0	0	0	0	0	0
19	.01	.01	.01	.01	.01	0	0	0	0	0	0	0
20	.01	.01	.01	.01	.01	0	0	0	0	0	0	0
21	.01	.01	.01	.02	0	0	0	0	0	0	0	0
22	.01	.01	.01	.02	0	0	0	0	0	0	0	0
23	.01	.01	.01	.01	0	0	0	0	0	0	0	0
24	.01	.01	.01	.01	0	0	0	0	0	0	0	0
25	.01	.01	.01	.01	0	0	0	0	0	0	0	0
26	.01	.01	.01	.01	0	0	0	0	0	0	0	0
27	.01	.02	.01	.01	0	0	0	0	0	0	0	0
28	.01	.02	.01	.01	.01	0	0	0	0	0	0	0
29	.01	.01	.01	.01	0	0	0	0	0	0	0	0
30	.01	.01	.01	.01	0	0	0	0	0	0	0	0
31	.01	.01	.01	.01	0	0	0	0	0	0	0	0
Sum	0.24	0.30	0.81	0.37	0.19	0	0	0	0	0	0	0

Current Year 2001

Period 1937-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			18	0.01	11	0	0.01	20.7	424	10,581	0
Feb.			127	.02	11	.01	.01	25.9	547	5,288	0
Mar.			17	.10	12	.01	.03	70.0	875	11,587	0
April			19	.02	11	.01	.01	32.0	543	8,886	0
May			11	.01	117	0	.01	16.4	265	3,956	0
June			11	0	11	0	0	0	130	2,234	0
July			11	0	11	0	0	0	70.5	1,525	0
Aug.			11	0	11	0	0	0	64.4	2,008	0
Sept.			11	0	11	0	0	0	47.3	1,214	0
Oct.			11	0	11	0	0	0	59.1	1,084	0
Nov.			11	0	11	0	0	0	117	1,522	0
Dec.			11	0	11	0	0	0	201	1,953	0
Yearly				0.10		0	0.01	165	3,343	38,639	0

φ Mean daily

! And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 11-0131.00 INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

**DESCRIPTION:** Rodriguez Dam is located in Mexico on Rio de las Palmas, the principal tributary to the Tijuana River, about 9.0 kilometers upstream from its confluence with Cottonwood Creek, 17.0 kilometers upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 16.0 kilometers 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 Agriculture and 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 Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 2001. Storage began in Rodriguez Reservoir on September 22, 1936.

**REMARKS:** Records of runoff represent all water reaching Rodriguez 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 155.85 meters above mean sea level; at top of spillway gates 125.00 meters above mean sea level. Reservoir capacity at spillway crest 94 TCM; at top of spillway gates 137 TCM.

**EXTREMES:** Maximum monthly inflow, 237,657 TCM, January 1993; minimum, no flow during part of most years.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1938 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	0	6,051	237,657	0
February	0	8,267	194,216	0
March	0	12,175	172,556	0
April	0	3,625	95,953	0
May	0	777	14,136	0
June	0	228	5,749	0
July	0	116	1,806	0
August	0	63.9	950	0
September	0	64.7	575	0
October	0	81.2	432	0
November	0	168	2,393	0
December	0	896	19,348	0
Yearly	0	32,513	412,673	0

## 11-0132.00 DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipeline which carries water from Rodriguez Reservoir to Gate No. 1 (Poblado Presa) and to Gate No. 2 (City Aqueduct). Formerly, water for irrigation was also diverted to the North and South Canals.

RECORDS: Direct recording by Sparling flow meter. Records through May 1961 were obtained by the Ministry of Agriculture and Hydraulic Resources; from June 1961 to March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana; and from April 1966 through 1991 by the State of Baja California Commission of Public Services for Tijuana. Since 1992, the data have been obtained by the National Water Commission. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 2001.

REMARKS: Beginning in January 1937, diversions for irrigation began from both sides for the Tijuana Valley and for domestic use at the village by Rodriguez Dam and the City of Tijuana. Since February 1960, no water has been released for irrigation of farmlands.

EXTREMES: Maximum monthly diversion, 36,018 TCM, March 1996; minimum, no flow on several occasions since March 1941.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 2001	PERIOD 1938 - 2001		
		AVERAGE	MAXIMUM	MINIMUM
January	0	655	6,183	0
February	0	639	6,028	0
March	0	1,191	36,018	0
April	71.9	783	6,142	0
May	288	982	6,578	0
June	285	1,097	5,893	0
July	135	1,263	5,681	0
August	168	1,181	5,931	0
September	186	1,048	6,158	0
October	198	954	6,054	0
November	111	825	5,873	0
December	342	774	6,212	0
Yearly	1,785	11,391	94,980	0

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 11-0133.00 TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on top of north levee about 1.1 kilometers downstream (north) from boundary, 1.8 kilometers upstream from the new Dairy Mart Road bridge, and 2.3 kilometers west of the international gate at San Ysidro, California. Zero of the gage is at mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements, staff gage readings and record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 2001.

EXTREMES: Since May 1947: Maximum instantaneous discharge, 937 CMS, February 21, 1980; minimum discharge, no flow during many years since 1951.

## MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.34	2.30	0	0	0	0	0	0	0	0	0.05
2	0	.04	1.42	0	0	0	0	0	0	0	0	0
3	.08	.06	1.20	0	0	0	0	0	0	0	0	0
4	0	.01	1.08	0	0	0	0	0	0	0	0	.32
5	0	.03	1.03	0	0	0	0	0	0	0	.48	0
6	0	.08	5.91	.09	0	0	0	0	0	0	.82	0
7	0	.54	2.91	1.75	0	0	0	0	0	0	.50	0
8	.91	1.11	1.60	1.44	0	0	0	0	0	0	.06	.03
9	3.42	.99	1.43	1.83	0	0	0	0	0	0	0	.03
10	.42	.91	2.74	3.82	0	0	0	0	0	0	0	.09
11	10.0	.89	2.19	1.87	0	0	0	0	0	0	0	.82
12	2.82	.35	1.54	1.18	0	0	0	0	0	0	.25	.10
13	1.74	4.93	1.33	1.03	0	0	0	0	0	0	.92	0
14	1.49	3.30	1.16	.40	0	0	0	0	0	0	.25	0
15	1.23	1.71	1.07	.05	0	0	0	0	0	0	0	.76
16	1.03	1.33	1.06	.05	0	0	0	0	0	0	0	.16
17	.95	1.26	.99	.01	0	0	0	0	0	0	0	0
18	.86	1.15	.85	.01	0	0	0	0	0	0	0	.05
19	.90	1.13	.82	0	0	0	0	0	0	0	0	0
20	.94	2.41	.79	0	0	0	0	0	0	0	0	0
21	.97	2.49	.85	3.45	0	0	0	0	0	0	0	.93
22	1.05	2.45	.89	2.10	0	0	0	0	0	0	0	1.54
23	1.10	3.80	.91	1.03	0	0	0	0	0	0	0	1.20
24	1.06	2.46	.84	.38	0	0	0	0	0	0	.35	.22
25	.73	3.00	.82	.35	0	0	0	0	0	0	.79	0
26	1.37	4.24	.84	.36	0	0	0	0	0	0	.21	0
27	2.48	5.67	.96	.36	0	0	0	0	0	0	0	0
28	1.12	4.18	.94	.38	0	0	0	0	0	0	0	0
29	.87		.90	.52	0	0	0	0	0	0	0	0
30	.85		.83	.40	0	0	0	0	0	0	.51	0
31	.86		.33		0	0	0	0	0	0	0	0
Sum	39.25	50.86	42.53	22.86	0	0	0	0	0	0	5.14	6.30

Current Year 2001

Period 1947-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum
				Day	Low						
Jan.	13.210	11.920	11	40.9	! 1	0	1.27	3,391	9,081	297,879	0
Feb.	12.675	11.920	27	9.65	! 1	0	1.82	4,394	14,236	388,951	0
Mar.	12.680	11.920	7	9.76	! 1	0	1.37	3,675	16,934	362,019	0
April	12.400	11.920	6	5.49	! 1	0	.76	1,975	4,381	77,633	0
May	11.920	11.920	! 1	0	! 1	0	0	0	2,108	52,545	0
June	11.920	11.920	! 1	0	! 1	0	0	0	737	11,460	0
July	11.920	11.920	! 1	0	! 1	0	0	0	533	11,400	0
Aug.	11.920	11.920	! 1	0	! 1	0	0	0	636	21,083	0
Sept.	11.920	11.920	! 1	0	! 1	0	0	0	310	5,142	0
Oct.	11.920	11.920	! 1	0	! 1	0	0	0	402	6,859	0
Nov.	12.195	11.920	24	3.19	! 1	0	.17	444	604	5,399	0
Dec.	12.225	11.920	15	3.15	! 1	0	.20	544	1,068	8,270	0
Yearly	13.210	11.920		40.9	! 1	0	0.46	14,423	51,030	734,832	0

! And other days

## 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 thousand cubic meters. The reservoir capacities indicated are total capacities at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodriguez Dams, 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 Rodriguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodriguez 1927, when the reservoir area was initially surveyed.

The storage data for Morena and Barrett reservoirs are obtained and provided by the City of San Diego, California and the U.S. Geological Survey. The data for Rodriguez Dam were provided by the Secretariat of Hydraulic Resources in Mexico up to May 1961, from June 1961 to March 1966 the data were provided by the Potable Water and Sewerage Board for the Urban District of Tijuana, from April 1966 to December 1991, the data were provided by the State Public Service Commission of Tijuana, Baja California, and since 1992, by the National Water Commission of Mexico.

## IN THOUSAND CUBIC METERS

Month	MORENA RESERVOIR, CALIFORNIA (Capacity 61,933)		BARRETT RESERVOIR, CALIFORNIA (Capacity 55,211)		RODRIGUEZ RESERVOIR, BAJA CALIFORNIA (Capacity 138,000)		TOTAL IN TIJUANA RIVER BASIN RESERVOIRS (Capacity 255,147)	
	2001	Average 1937-2001	2001	Average 1937-2001	2001	Average 1937-2001	2001	Average 1937-2001
Jan.	19,036	25,152	11,143	18,976	13,098	41,383	43,277	85,511
Feb.	19,269	26,468	8,945	19,940	13,326	43,844	41,540	90,252
Mar.	19,459	27,891	7,539	22,192	13,440	49,280	40,438	99,363
April	19,067	28,047	7,011	22,868	13,269	50,171	39,347	101,086
May	16,344	27,829	7,965	22,653	13,666	49,319	37,975	99,801
June	13,429	27,128	8,670	21,863	12,623	48,156	34,722	97,147
July	10,616	26,130	9,570	20,948	12,011	45,549	32,197	92,827
Aug.	8,156	25,599	9,982	19,947	11,586	43,486	29,724	89,032
Sept.	7,811	24,894	9,482	19,206	11,093	41,886	28,386	85,986
Oct.	7,606	24,410	9,380	18,528	10,685	40,292	27,671	83,230
Nov.	7,420	24,205	9,317	18,013	10,418	39,508	27,155	81,726
Dec.	7,377	24,278	9,349	18,182	10,250	39,346	26,976	81,806
Avg.	12,966	26,019	9,029	20,276	12,122	44,352	34,117	90,647
Max.	19,459	#1 76,069	11,143	*! 56,641	13,666	! 138,486	43,277	! 263,471
Min.	7,377	!! 12	7,011	!! 131	10,250	!! 0	26,976	!! 1,559

# - March 31, 1941 - Prior to removal of spillway gates

\* - April 30, 1937 - Sandbags were placed on crest of spillway

! - Maximum end of month storage for period of record

!! - Minimum end of month storage for period of record

RAINFALL ON THE TIJUANA RIVER WATERSHED  
IN MILLIMETERS

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 following rainfall data.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Sawday Ranch, California		Campo, California	
	2001	Average 1906-2001	2001	Average 1907-2001	2001	Average 1951-2001	2001	Average 1950-2001	2001	Average 1900-2001
Jan.	109	99	88	90	#	#	94	92	74	79
Feb.	124	99	97	89	#	#	109	85	105	83
Mar.	50	90	40	82	#	#	44	79	45	73
April	64	42	50	38	#	#	55	37	37	34
May	0	15	1	13	#	#	0	9	1	12
June	0	4	0	2	#	#	0	2	0	2
July	1	9	1	3	#	#	6	14	3	12
Aug.	3	14	5	6	#	#	12	21	0	13
Sept.	8	11	0	7	#	#	1	12	6	9
Oct.	0	21	0	17	#	#	0	14	T	16
Nov.	36	40	35	36	#	#	31	42	28	34
Dec.	47	75	32	67	#	#	42	57	26	60
Yearly	442	519	349	450			394	464	325	427

Month	Chula Vista, California		Lower Otay Dam, California						
	2001	Average 1930-2001	2001	Average 1906-2001					
Jan.	110	49	87	57					
Feb.	80	47	63	48					
Mar.	18	44	31	55					
April	6	20	40	26					
May	1	5	3	9					
June	0	2	0	3					
July	0	1	0	1					
Aug.	0	2	0	3					
Sept.	0	4	0	6					
Oct.	0	9	0	10					
Nov.	16	27	23	30					
Dec.	12	38	17	37					
Yearly	242	248	264	285					

T Trace

IN MEXICO

Month	El Pinal, Baja California		El Hongo, Baja California		Ignacio Zaragoza, Baja California		Tecate, Baja California		El Carrizo, Baja California	
	2001	Average 1964-2001	2001	Average 1980-2001	2001	Average 1965-2001	2001	Average 1946-2001	2001	Average 1980-2001
Jan.	#	84	57	65	90	63	96	77	74	45
Feb.	#	90	88	70	105	75	107	59	74	54
Mar.	#	94	24	65	0	65	48	66	22	56
April	#	37	23	20	16	25	53	28	29	19
May	#	9	0	6	0	6	2	7	0	4
June	#	1	0	3	0	2	0	3	0	2
July	#	18	6	13	3	3	3	4	T	3
Aug.	#	23	0	18	0	7	0	5	0	2
Sept.	#	18	5	7	0	9	0	5	0	4
Oct.	#	16	0	10	0	14	0	12	0	13
Nov.	#	46	18	28	20	38	29	34	14	28
Dec.	#	71	27	32	34	46	35	49	17	30
Yearly		494	248	334	268	362	373	350	230	268

# Missing record

T Trace

RAINFALL ON THE TIJUANA RIVER WATERSHED  
IN MILLIMETERS

IN MEXICO

	Valle de Palmas, Baja California		Rodriguez Dam, Baja California			
	2001	Average 1948-2001	2001	Average 1938-2001		
Jan.	59	45	122	46		
Feb.	81	40	88	44		
Mar.	22	40	28	43		
April	24	16	17	19		
May	0	4	T	4		
June	0	1	0	1		
July	17	2	0	1		
Aug.	0	5	0	3		
Sept.	0	5	0	6		
Oct.	0	9	0	9		
Nov.	7	20	17	23		
Dec.	16	27	17	37		
Yearly	226	204	289	233		

T Trace

## LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 2001.

## IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	@ ELEV. (Meters)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32° 41'	116° 40'	494.69	1907	City of San Diego
Campo, California	32° 38'	116° 28'	801.62	1877	County of San Diego
Chula Vista, California	32° 36'	117° 06'	2.74	1930	Chula Vista Fire Department
Lower Otay Dam, California	32° 37'	116° 56'	164.59	1906	City of San Diego
Marron Valley, California	32° 34'	116° 46'	167.64	1951	County of San Diego
Morena Dam, California	32° 41'	116° 31'	937.26	1906	City of San Diego
Sawday Ranch, California	32° 45'	116° 29'	975.36	1950	Ben and Kelly Tulloch

## IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	@ ELEV. (Meters)	RECORD BEGAN	OBSERVER
Ignacio Zaragoza, Baja California	32° 12'	116° 29'	555.04	1965	** CNA
El Carrizo, Baja California	32° 29'	116° 42'	494.99	1980	CNA
El Hongo, Baja California	32° 31'	116° 18'	960.12	1981	CNA
El Pinal, Baja California	32° 11'	116° 17'	"1350.00	1964	CNA
Rodriguez Dam, Baja California	32° 27'	116° 54'	120.09	1938	CNA
Tecate, Baja California	32° 33'	116° 41'	480.06	1946	CNA
Valle de las Palmas, Baja California	32° 22'	116° 37'	280.11	1948	CNA

@ Elevation above mean sea level

" Estimated from topographic maps

\*\* Baja California State Office of the National Water Commission

EVAPORATION IN THE TIJUANA RIVER BASIN  
IN MILLIMETERS

Tabulated below are records of evaporation observed at 3 stations in California and at 2 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 Agriculture and Hydraulic Resources of Mexico. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Tijuana River Watershed" in this bulletin.

Types of pans used:

1. Barrett Reservoir: January 1921 through September 1926, square 0.91-meter by 0.91-meter by 0.46-meter deep floating pan. October 1926 through 2001, square 0.91-meter by 0.91-meter by 0.46-meter deep land pan set 0.38-meter in ground.
2. Morena Reservoir: October 1915 through December 1921, square 0.91-meter by 0.91-meter by 0.46-meter deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 0.91-meter by 0.91-meter by 0.46-meter deep floating pan and a land pan of the same dimensions. September 1926 through 2001, square 0.91-meter by 0.91-meter by 0.46-meter deep land pan set 0.38-meter in ground.
3. Lower Otay Dam: January 1950 through 2001, square 0.91-meter by 0.91-meter by 0.46-meter deep land pan set 0.38-meter in ground.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Lower Otay Dam California	
	2001	Average 1916-2001	2001	Average 1921-2000	2001	Average 1950-2001
Jan.	68	55	33	47	51	49
Feb.	10	53	26	53	82	57
Mar.	67	81	57	83	90	85
April	90	117	78	115	115	118
May	212	164	141	162	151	153
June	223	210	183	199	192	175
July	259	241	185	234	196	208
Aug.	256	224	195	221	196	196
Sept.	211	178	159	179	167	161
Oct.	164	125	113	126	119	118
Nov.	79	79	55	77	65	72
Dec.	42	57	29	49	52	55
Yearly	1,681	1,584	1,254	1,545	1,476	1,447

IN MEXICO

Month	Rodriguez Dam, Baja California		El Carrizo, Baja California	
	2001	Average 1939-2001	2001	Average 1980-2001
Jan.	65	100	111	133
Feb.	58	102	87	114
Mar.	81	109	99	138
April	108	139	146	181
May	149	131	210	220
June	179	190	306	273
July	182	213	264	295
Aug.	179	198	290	291
Sept.	143	164	250	241
Oct.	107	136	186	208
Nov.	61	107	110	152
Dec.	56	85	103	134
Yearly	1,368	1,690	2,162	2,358

TEMPERATURE IN THE TIJUANA RIVER BASIN  
IN DEGREES CELSIUS

The maximum, minimum, and monthly average temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few meters 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 on Tijuana River Watershed" in this bulletin.

IN THE UNITED STATES

Month	Barrett Dam, California				Campo, California				Chula Vista, California			
	2001			Average 1931- 2001	2001			Average 1951- 2001	2001			Average 1931- 2001
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	10.2	25.6	-1.7	9.8	7.7	23.9	-6.1	8.7	12.2	27.8	2.2	12.1
Feb.	10.6	29.4	-1.7	10.8	8.1	26.1	-7.2	9.3	13.1	30.6	3.3	12.9
Mar.	13.9	30.6	2.8	12.1	10.8	29.4	-2.2	10.1	15.0	30.0	6.1	13.6
April	13.8	31.7	1.7	14.6	11.5	31.7	-2.2	12.3	14.9	30.0	6.1	15.0
May	20.2	37.2	6.1	17.2	18.4	37.8	1.7	15.1	17.7	25.0	10.6	16.4
June	23.2	37.8	8.3	20.5	20.8	37.2	4.4	18.7	19.4	27.2	13.3	17.8
July	23.7	37.8	9.4	24.4	21.2	37.2	2.8	22.7	20.6	28.3	13.9	19.9
Aug.	25.5	40.0	10.0	24.7	24.0	39.4	3.3	22.9	20.9	26.7	16.1	20.8
Sept.	23.8	38.3	9.4	22.6	21.5	37.8	2.2	20.5	20.1	30.0	11.1	20.1
Oct.	20.5	36.1	8.3	18.1	17.5	35.6	1.0	16.0	19.2	30.6	10.6	17.8
Nov.	14.6	27.2	0	13.5	12.6	26.7	-3.9	11.4	15.4	25.6	2.2	14.9
Dec.	9.8	24.4	-0.6	10.4	8.1	23.9	-5.6	8.8	12.8	26.7	1.1	12.8
Yearly	17.5	40.0	-1.7	16.6	15.2	39.4	-7.2	14.7	16.8	30.6	1.1	16.2

IN MEXICO

Month	Rodriguez Dam, Baja California				El Hongo, Baja California				Ignacio Zaragoza, Baja California			
	2001		1938-2001		2001		1981-2001		2001		1965-2001	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	30	3	32	-3	19	-3	26	-9	25	-8	34	-8
Feb.	32	3	34	0	23	-1	27	-3	27	-8	32	-8
Mar.	31	6	38	0	26	1	29	-2	27	-6	36	-7
April	32	5	40	2	28	-1	34	-1	29	-4	38	-4
May	31	10	39	3	38	7	40	1	35	-2	40	-2
June	33	13	42	8	36	8	47	2	36	2	43	-2
July	33	15	40	8	39	12	45	8	36	2	45	1
Aug.	34	14	41	10	39	14	41	3	37	3	45	3
Sept.	36	12	43	8	36	9	39	2	38	4	44	1
Oct.	32	11	42	1	32	6	37	0	33	0	40	-6
Nov.	26	5	37	-1	24	1	30	-2	26	-4	34	-9
Dec.	27	3	34	-3	23	-1	27	-8	21	-9	33	-9
Yearly	36	3	43	-3	39	-3	47	-9	38	-9	45	-9

Month	Tecate, Baja California				El Carrizo, Baja California				Valle de Palmas, Baja California			
	2001		1946-2001		2001		1980-2001		2001		1948-2001	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	31	-1	38	-9	31	2	32	-1	28	-4	37	-11
Feb.	30	-1	38	-8	29	3	34	-2	30	-2	37	-5
Mar.	31	1	36	-5	30	2	37	-4	31	0	38	-2
April	33	0	39	-2	32	4	41	3	35	0	41	-2
May	35	5	42	1	33	8	42	5	41	4	44	1
June	38	8	44	0	35	11	42	9	40	7	48	4
July	36	8	46	2	35	10	46	8	40	7	49	6
Aug.	41	9	47	1	36	11	45	5	41	8	48	5
Sept.	39	7	46	2	38	10	42	5	42	6	47	3
Oct.	38	7	41	-3	33	10	40	6	39	3	43	0
Nov.	32	0	37	-3	30	4	35	4	31	1	38	-7
Dec.	25	-4	36	-5	26	3	34	-3	26	-4	35	-6
Yearly	41	-4	47	-9	38	2	46	-4	42	-4	49	-11

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

2001

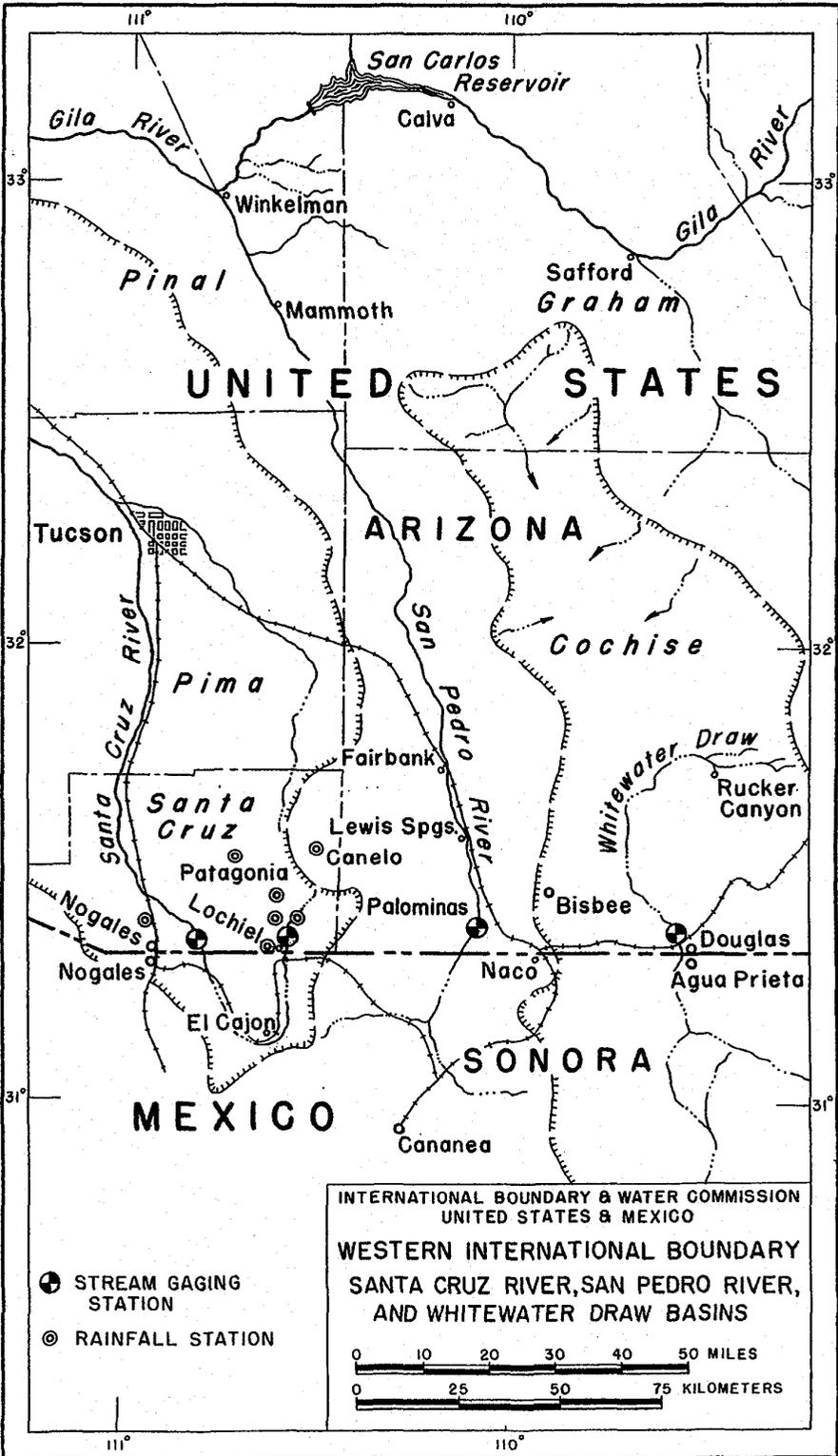
The total area within the Tijuana River basin is 4,484 square kilometers, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by Mr. Art Letter, General Manager, Tia Juana Valley County Water District, or estimated from aerial photographs. Those in Mexico were furnished by the National Water Commission of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana River basin in 2001 was by pumping from ground water.

Designation of Areas	Drainage Basin-Square Kilometers			Irrigated Areas-Hectares		
	United States	Mexico	Total	United States	Mexico	Total
Cottonwood Creek above Morena Dam	295	0	295	0		0
Morena Dam to Barrett Dam	344	0	344	0		0
above Barrett Dam	640	0	640	0		0
below Barrett Dam and above Tecate Creek	168	0	168	0		0
above Tecate Creek	808	0	808	0		0
Campo Creek above International Boundary	220	10	230	0		0
Tecate Creek above International Boundary (not including Campo Creek)	49	166	215	0		0
Cottonwood Creek above International Boundary Station	1,070	176	1,246	0		0
Rio de las Palmas above Rodriguez Dam	18	2,541	2,559	0	(b)	0
Tijuana River above Nestor Gaging Station	1,186	3,279	4,465	49		49
above the Mouth	1,197	3,287	4,484	(a) 244		244

(a) Data from Otay Water District, leased areas from IBWC irrigation and private landowners.

(b) There was no irrigation in 2001 in the Tijuana Irrigation District, Tijuana Valley, Baja California Mexico, from the Rodriguez Reservoir.



INTERNATIONAL BOUNDARY & WATER COMMISSION  
 UNITED STATES & MEXICO

WESTERN INTERNATIONAL BOUNDARY  
 SANTA CRUZ RIVER, SAN PEDRO RIVER,  
 AND WHITEWATER DRAW BASINS

0 10 20 30 40 50 MILES  
 0 25 50 75 KILOMETERS

09-5375.00 WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 137 meters upstream from the Southern Pacific Railroad bridge, 2.4 kilometers upstream from the international boundary, and 3.2 kilometers west of Douglas, Arizona. Zero of gage is 1,191.505 meters above mean sea level, U. S. C. & G. S. datum of 1929. Location April 26, 1972 to April 10, 1974 was 61 meters upstream from bridge with the datum 1.340 meters higher.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by the U. S. Section of the Commission. Records fair. 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), July 1930 to December 1933, May 1935 to July 1947, October 1947 through 2001 (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.

EXTREMES: Prior to 1936: Maximum recorded discharge, 97.7 CMS August 10, 1931 (gage height 3.700 meters); maximum estimated discharge, 115 CMS July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 143 CMS August 7, 1955; maximum gage height, 5.045 meters July 29, 1966; minimum daily discharge, no flow at times during most years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	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	0	0	0	0	0	0	0	0	0	0
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	0	0
6	.02	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	.14	0	0	0	0	0
8	0	0	0	0	0	0	.18	0	0	0	0	0
9	0	0	0	0	0	0	.67	0	0	.16	0	0
10	0	0	0	0	0	0	.14	0	0	0	0	0
11	0	0	0	0	0	0	.05	.35	0	0	0	0
12	0	0	0	0	0	0	0	2.09	0	0	0	0
13	0	0	0	0	0	0	0	1.52	0	0	0	0
14	0	0	0	0	0	0	0	0	.59	0	0	0
15	0	0	0	0	0	0	0	.05	.13	0	0	0
16	0	0	0	0	0	0	0	.37	0	0	0	0
17	0	0	0	0	0	0	0	.41	0	0	0	0
18	0	0	0	0	0	0	.13	0	0	0	0	0
19	0	0	0	0	0	0	.74	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	.28	0	0	0	0	0
25	0	0	0	0	0	.09	.23	0	0	0	0	0
26	0	0	0	0	0	.23	.08	0	0	0	0	0
27	0	0	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	0	.16	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	.12	0	0	0	0	0
Sum		0	0	0	0	0.32		4.79		0.16		0
	0.02		0		0		2.92		0.72		0	

Current Year 2001

Period 1936-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
				Day							
Jan.	1.485	1.380	6	0.19	1	0	0	1.7	40.0	556	0
Feb.	1.380	1.380	1	0	1	0	0	0	18.7	163	0
Mar.	1.380	1.380	1	0	1	0	0	0	23.7	364	0
April	1.380	1.380	1	0	1	0	0	0	17.4	213	0
May	1.380	1.380	1	0	1	0	0	0	12.4	170	0
June	1.780	1.380	26	1.10	1	0	.01	27.6	126	1,961	0
July	2.010	1.380	19	2.59	1	0	.09	252	1,830	10,004	0
Aug.	2.125	1.380	12	3.68	1	0	.15	414	2,978	17,861	0
Sept.	1.830	1.380	14	1.34	1	0	.02	62.2	778	3,910	0
Oct.	1.625	1.380	9	.52	1	0	.01	13.8	456	7,528	0
Nov.	1.380	1.380	1	0	1	0	0	0	58.5	765	0
Dec.	1.380	1.380	1	0	1	0	0	0	124	2,915	0
Yearly	2.125	1.380		3.68		0	0.02	771	6,463	27,533	0

! And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

SEWAGE INFLUENT, DOUGLAS, ARIZONA  
INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Parshall flume in the influent line of the older trickling filter unit and a Parshall flume in the influent line of the newer extended aeration unit. The treatment plant is located about 1.6 kilometers west of the Douglas-Agua Prieta Port of Entry immediately adjacent to the international boundary in Douglas, Cochise County, Arizona.

RECORDS: Continuous monthly records since March 1948; daily records from March 18, 1948 through 1950 and from January 1952 through 2001.

REMARKS: The older 4.9 thousand cubic meters per day trickling filter unit was constructed in 1947 by the International Boundary and Water Commission. Since April 8, 1968 all sewage from Agua Prieta has been retained and treated in Mexico to be used for irrigation along with the effluent from the Douglas International Treatment Plant. On July 1, 1973, ownership and operation of the plant was transferred from the International Boundary and Water Commission to the City of Douglas. In 1980 the plant was enlarged, with the addition of the extended aeration unit bringing the total capacity up to 9.8 thousand cubic meters per day. The effluent from the Douglas Treatment Plant is discharged through a conduit to Mexico.

Month	Total Monthly Flows			Mean Daily Flows—Thousand Cubic Meters Per Day					
	Thousand Cubic Meters			Current Year 2001			Period 1952–2001		
	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	286	0	286	18.8	5.0	9.2	18.8	1.6	4.5
Feb.	143	0	143	10.9	3.8	5.1	17.7	2.1	4.5
Mar.	176	0	176	11.5	4.1	5.6	13.9	2.2	4.4
April	199	0	199	18.1	4.2	6.6	18.1	1.4	4.5
May	180	0	180	9.5	2.0	5.8	15.0	1.9	4.5
June	161	0	161	7.6	3.7	5.3	15.0	2.1	4.6
July	206	0	206	7.8	3.6	6.6	14.1	1.8	4.8
Aug.	182	0	182	8.6	3.7	5.9	15.1	1.4	4.8
Sept.	192	0	192	9.8	3.7	6.4	9.8	1.8	4.7
Oct.	191	0	191	9.4	3.0	6.2	13.8	2.2	4.6
Nov.	175	0	175	7.6	3.4	6.1	12.4	1.2	4.6
Dec.	223	0	223	11.7	2.7	7.2	12.6	1.7	4.6
Yearly	2,314	0	2,314	18.8	2.0	6.3	18.8	1.2	4.6

09-4705.00 SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on downstream side of the bridge pier at Highway 92, 1.1 kilometers east of Palominas, 4.0 kilometers upstream from Green Brush Draw, 7.2 kilometers downstream from international boundary, and 19 kilometers southwest of Bisbee, Arizona. Zero of gage is 1,276.39 meters above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 2001. Records obtained and furnished by U. S. Geological Survey prior to October 1, 1981 and from October 1, 1995 through 2001, and by the United States Section of the Commission from October 1, 1981 through September 30, 1995.

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

EXTREMES: Maximum daily discharge, 623 CMS on August 14, 1940 (gage height 4.93 meters present datum), from rating curve extended above 159 CMS on basis of slope-area measurement of peak flow; no flow at time in most years. Greatest flood known occurred on September 28, 1926 (gage height, about 7.28 meters present datum), from flood marks; discharge not determined.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.37	0.42	0.28	0.12	0.08	0.01	0	1.39	0.16	0.02	0.01	0.04
2	.37	.42	.25	.12	.08	.01	0	.54	.15	.02	.01	.05
3	.37	.40	.25	.11	.07	.01	0	2.35	.15	.02	.01	.05
4	.34	.40	.24	.10	.07	.01	0	.45	.14	.02	.01	.05
5	.37	.37	.23	.11	.08	.01	0	.71	.13	.02	.01	.06
6	.40	.37	.22	.21	.10	.01	2.10	.48	.12	.02	.01	.06
7	.42	.37	.24	.28	.08	0	1.64	.48	.10	.02	.01	.06
8	.42	.37	.25	.20	.07	0	.23	.57	.09	.02	.01	.06
9	.51	.34	.25	.17	.07	0	.08	1.02	.08	.02	.01	.06
10	.57	.34	.24	.16	.06	0	.26	.59	.07	.01	.01	.07
11	.51	.31	.23	.16	.06	0	.20	4.13	.06	.01	.02	.07
12	.54	.31	.22	.16	.05	0	.04	41.3	.06	.01	.02	.08
13	.57	.31	.20	.16	.06	0	.19	5.78	.09	.01	.02	.08
14	.54	.31	.17	.14	.05	.01	.48	62.6	.14	.01	.02	.08
15	.54	.31	.16	.16	.04	.01	.71	4.81	.07	.01	.02	.09
16	.51	.31	.18	.19	.03	.01	.51	4.30	.06	.01	.02	.09
17	.51	.31	.17	.12	.03	.01	11.4	1.22	.05	.01	.02	.09
18	.48	.31	.17	.10	.02	.01	.91	.54	.04	.01	.02	.09
19	.48	.31	.16	.10	.03	.01	4.87	.37	.03	.01	.02	.09
20	.45	.31	.17	.09	.03	.02	4.16	.40	.03	.01	.02	.10
21	.45	.31	.16	.10	.03	.96	.93	5.52	.03	.01	.02	.10
22	.45	.31	.16	.10	.01	.07	2.89	.51	.03	.01	.02	.10
23	.45	.31	.15	.10	.01	.01	9.97	.23	.03	.01	.03	.10
24	.45	.31	.15	.09	.01	0	1.05	.18	.02	.01	.03	.10
25	.42	.31	.15	.10	.01	.01	1.59	.16	.02	.01	.03	.10
26	.42	.31	.14	.10	.01	.01	2.27	.14	.01	.01	.03	.11
27	.42	.31	.14	.09	.01	.01	.91	.14	.01	.01	.04	.11
28	.45	.31	.13	.09	.01	.01	.28	.14	.01	.01	.04	.10
29	.45	.31	.13	.08	.01	.37	10.5	.15	.01	.01	.04	.10
30	.45	.31	.13	.07	.01	.01	2.49	.18	.01	.01	.04	.10
31	.45	.31	.13	.07	.01	.01	.93	.18	.01	.01	.04	.11
Sum	14.13	9.38	5.85	3.88	1.29	1.60	61.59	141.56	2.00	0.40	0.62	2.55

Current Year 2001

Period 1951-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day			Total	Average	Maximum	Minimum
					Day	Low					
Jan.	0.910	0.860	10	0.65	! 3	0.34	0.46	1,221	2,317	35,987	3.2
Feb.	.880	.850	1	.45	! 10	.31	.34	810	979	8,343	3.7
Mar.	.850	.790	1	.31	! 29	.12	.19	505	848	9,129	16.4
April	.860	.740	7	.40	! 30	.06	.13	335	202	1,282	0
May	.785	.660	6	.17	! 23	.01	.04	111	66.0	502	0
June	1.065	.620	21	4.42	! 1	0	.05	138	211	3,631	0
July	1.970	.620	23	40.8	! 1	0	1.99	5,321	5,417	21,263	0
Aug.	3.930	.610	14	196	! 27	.12	4.57	12,231	8,908	44,860	204
Sept.	.655	.560	14	.18	! 25	.01	.07	173	2,000	20,160	1.7
Oct.	.605	.560	! 3	.03	! 1	.01	.01	34.6	2,815	58,371	0
Nov.	.625	.565	! 26	.04	! 1	.01	.02	53.6	828	19,006	0
Dec.	.635	.625	27	.12	! 1	.04	.08	220	1,922	31,428	7.6
Yearly	3.930	0.560		196		0	0.67	21,153	26,513	80,483	5,427

! And other days

WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

09-4800.00 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, 4.0 kilometers northeast of Lochiel, Arizona, and 2.7 kilometers 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 1,408 meters.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 2001.

REMARKS: There are small diversions by ground water pumping for irrigating about 80.9 hectares above this station. EXTREMES: Maximum discharge, 362 CMS on August 15, 1984, (gage height 3.19 meters); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.22	0.12	0.08	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01
2	.23	.12	.08	.05	.04	.03	.02	.02	.02	.01	.01	.01
3	.20	.12	.08	.05	.04	.03	.02	.01	.01	.01	.01	.01
4	.19	.12	.07	.05	.04	.03	.02	.02	.01	.01	.01	.01
5	.19	.12	.07	.05	.04	.03	.03	.02	.01	.01	.01	.01
6	.21	.12	.07	.14	.04	.03	.03	.02	.01	.01	.01	.01
7	.20	.12	.08	.08	.04	.02	.03	.01	.01	.01	.01	.01
8	.18	.11	.08	.07	.04	.03	.03	.01	0	.01	.01	.01
9	.20	.10	.07	.06	.04	.03	.03	.01	.01	.01	.01	.01
10	.20	.10	.07	.06	.04	.03	.03	.02	.01	.01	.01	.01
11	.18	.10	.07	.06	.04	.03	.04	.02	0	.01	.01	.01
12	.18	.10	.07	.05	.03	.03	.03	.02	0	.01	.01	.01
13	.18	.09	.06	.05	.03	.03	.03	.01	.01	.01	.01	.01
14	.17	.09	.07	.05	.03	.03	.03	.02	.01	.01	.01	.01
15	.17	.09	.06	.04	.03	.02	.03	.02	.01	.01	.01	.01
16	.16	.09	.06	.05	.03	.02	.03	.02	.01	.01	.01	.01
17	.16	.09	.06	.05	.02	.03	.03	.03	.01	.01	.01	.01
18	.16	.09	.06	.04	.03	.03	.02	.02	.01	.01	.01	.01
19	.16	.09	.06	.04	.03	.03	.02	.02	.01	.01	.01	.01
20	.15	.08	.06	.04	.03	.03	.02	.02	.01	.01	.01	.01
21	.15	.08	.05	.04	.03	.03	.02	.01	0	.01	.01	.02
22	.14	.08	.05	.04	.02	.03	.03	.01	0	.01	.01	.02
23	.14	.08	.05	.04	.03	.02	.03	.01	0	.01	.01	.02
24	.14	.08	.05	.04	.03	.02	.02	.01	0	.01	.01	.02
25	.13	.08	.04	.04	.03	.03	.02	.01	.01	.01	.01	.02
26	.13	.08	.04	.04	.03	.02	.02	.01	.01	.01	.01	.02
27	.15	.08	.04	.04	.03	.02	.02	.01	.01	.01	.01	.02
28	.14	.09	.04	.04	.03	.02	.02	.01	.01	.01	.01	.02
29	.13	.04	.04	.04	.03	.02	.03	.01	.01	.01	.01	.02
30	.14	.04	.03	.03	.03	.02	.02	.01	.01	.01	.01	.02
31	.12		.05		.03		.02	.02		0		.02
Sum	5.20	2.71	1.87	1.52	1.02	0.80	0.81	0.48	0.25	0.30	0.30	0.43

Current Year 2001

Period 1949-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters							
	High	Low	Day	φ High		Day		φ Low	Total	Average	Maximum	Minimum			
				Day	φ								Day	φ	
Jan.			2		0.23	31	0.12			449	350	8,822	1.6		
Feb.			1		.12	120	.08			.17	.10	234	125	1,233	2.2
Mar.			1		.08	125	.04			.06	.06	162	139	2,594	.9
April			6		.14	30	.03			.05	.05	131	65.8	638	0
May			1		.04	17	.02			.03	.03	88.1	34.0	210	0
June			1		.03	7	.02			.03	.03	69.1	24.5	208	0
July			12		.05	1	.02			.03	.03	70.0	603	5,267	2.0
Aug.			17		.03	1	.01			.02	.02	41.5	1,145	14,207	.1
Sept.			1		.02	1	0			.01	.01	21.6	352	3,249	0
Oct.			1		.01	31	0			.01	.01	25.9	362	5,837	0
Nov.			1		.01	1	.01			.01	.01	25.9	94.6	1,185	0
Dec.			120		.02	1	.01			.01	.01	37.2	143	1,348	0
Yearly					0.23		0			0.04		1,355	3,438	21,433	155

φ Mean daily

! And other days

## 09-4805.00 SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 8.9 kilometers east of Nogales, Arizona, 1.3 kilometers downstream from the international boundary and 9.7 kilometers upstream from the Santa Cruz bridge on State Highway No. 82. Zero of gage is 1,128.535 meters above mean sea level, U. S. C. & G. S. datum (levels by International Boundary and Water Commission).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. 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; and July 1935 through 2001.

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 2001.

EXTREMES: Maximum discharge, 949 CMS on October 9, 1977 (gage height 4.725 meters); minimum discharge, no flow for several days of many years.

## MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 2001 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.71	0.68	0.28	0.28	0.16	0.03	0	0.08	0.02	0.01	0.02	0.02
2	.65	.65	.28	.31	.14	.02	0	.08	.02	.01	.02	.02
3	.54	.65	.25	.34	.13	.02	0	.07	.02	.01	.02	.02
4	.71	.62	.27	.34	.12	.02	.01	.07	.02	.01	.02	.03
5	.93	.57	.26	.42	.11	.02	.02	.07	.02	.02	.02	.02
6	.91	.54	.24	6.26	.10	.02	.02	.06	.02	.71	.02	.02
7	.96	.54	.28	5.35	.08	.02	.25	.05	.02	.04	.02	.02
8	1.02	.48	.34	3.23	.08	.02	.02	.06	.02	.03	.02	.02
9	.96	.62	.34	2.63	.07	.02	.01	.05	.01	.02	.02	.02
10	.96	.71	.31	2.44	.05	.02	.01	.07	.01	.02	.02	.02
11	.85	.65	.31	2.12	.05	.02	.01	.06	.01	.02	.02	.02
12	.82	.62	.34	1.70	.05	.02	.02	.06	.01	.02	.02	.02
13	.79	.59	.34	1.44	.05	.01	.02	.05	.02	.02	.02	.02
14	.79	.54	.34	1.16	.05	.01	.02	.06	.02	.02	.02	.02
15	.82	.57	.31	.99	.04	.01	.02	.07	.01	.02	.02	.02
16	.79	.48	.27	.82	.04	.01	.02	.05	.01	.02	.02	.02
17	.82	.48	.28	.76	.04	.01	.02	.05	.01	.02	.02	.02
18	.76	.48	.28	.57	.04	.01	.02	.31	.01	.02	.02	.02
19	.68	.45	.27	.45	.04	0	.02	.23	.01	.02	.02	.02
20	.68	.42	.26	.37	.04	.05	.02	.14	.01	.02	.02	.02
21	.68	.34	.24	.34	.03	.04	.03	.05	.01	.02	.02	.03
22	.68	.37	.24	.26	.03	.03	.03	.05	.01	.02	.02	.03
23	.71	.34	.20	.25	.03	.03	.02	.04	.01	.02	.02	.02
24	.68	.31	.18	.24	.03	.02	.02	.04	.01	.02	.02	.03
25	.62	.31	.17	.23	.03	.03	.01	.04	.01	.02	.02	.03
26	.62	.31	.19	.21	.03	.02	.13	.03	.01	.02	.03	.03
27	.68	.31	.19	.19	.03	.02	.10	.03	0	.02	.03	.03
28	.45	.31	.18	.18	.03	.01	.07	.65	0	.02	.03	.03
29	.51		.21	.18	.03	.01	.07	1.05	0	.02	.03	.03
30	.57		.28	.17	.03	.01	.06	.02	.01	.02	.03	.03
31	.71		.31		.05		.16	.02		.02		.03
Sum	23.06	13.94	8.24	34.23	1.81	0.58	1.23	3.76	0.37	1.30	0.65	0.73

Current Year 2001

Period 1936-2001

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			8	1.02	28	0.45	0.74	1,992	2,895	37,352	0
Feb.			10	.71	124	.31	.50	1,204	2,150	25,344	0
Mar.			! 8	.34	25	.17	.27	712	1,862	24,145	0
April			6	6.26	30	.17	1.14	2,957	603	4,263	0
May			1	.16	!21	.03	.06	156	136	1,272	0
June			20	.05	19	0	.02	50.1	92.5	1,787	0
July			7	.25	! 1	0	.04	106	2,894	19,255	0
Aug.			29	1.05	!30	.02	.12	325	6,156	56,481	12.1
Sept.			! 1	.02	!27	0	.01	32.0	1,726	111,633	0
Oct.			6	.71	! 1	.01	.04	112	2,393	72,806	0
Nov.			!26	.03	! 1	.02	.02	56.2	773	12,180	0
Dec.			!21	.03	! 1	.02	.02	63.1	2,790	41,405	0
Yearly				6.26		0	0.25	7,765	24,471	108,071	1,662

φ Mean daily

! And other days

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

## SEWAGE INFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

**DESCRIPTION:** One 61-centimeter Parshall flume with a water-stage recorder is located at the international boundary for measuring raw wastewater from Nogales, Sonora. The plant influent and effluent flows are measured by flow meters and recorded on individual chart recorders and continuous totalizers. The Nogales Wash Pumping Plant flows are contaminated surface waters from Mexico captured in the U.S. and pumped into the international sewer trunk line downstream of the influent recorder. Flows determined by pump hour clocks. The Nogales International Treatment Plant is located adjacent to I-19, approximately 14.5 kilometers north of the international boundary, all within the City of Nogales, Santa Cruz County, Arizona.

**RECORDS:** Flows from the United States are deduced from total plant influent less the flows measured crossing the international boundary from Mexico. Records available: Continuous monthly record for plant influent since August 1951; daily records for plant influent, January 1952 through 2001.

**REMARKS:** Nogales International Treatment Plant treats combined sewage from both Nogales, Arizona and Nogales Sonora by means of aerated stabilization lagoons. In February 1991, a plant expansion was completed which increased the capacity to 65.1 thousand cubic meters per day. Ultraviolet disinfected effluent is discharged directly into the Santa Cruz River. Prior to the expansion, the plant capacity was 31.0 thousand cubic meters per day and chlorinated effluent was discharged directly to the Santa Cruz River. Prior to December 18, 1971 the plant was located along the right bank of Nogales Wash, approximately 3.2 kilometers north of the international boundary.

Month	Total Monthly Flows				Daily Flows—Thousand Cubic Meters Per Day					
	Thousand Cubic Meters				Current Year 2001			Period 1952-2001		
	U.S.	Mexico	Plant*	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	587	1,469	0	2,056	78.9	57.8	66.3	93.0	2.5	25.1
Feb.	490	1,373	0	1,863	73.9	62.6	66.5	80.4	2.5	25.7
Mar.	763	1,292	0	2,055	72.6	61.9	66.3	85.7	2.8	25.6
April	701	1,264	0	1,965	87.9	58.1	65.5	87.9	2.6	24.2
May	539	1,419	0	1,958	69.2	56.9	63.2	69.2	2.1	22.8
June	480	1,292	0	1,772	64.9	55.5	59.1	64.9	2.6	21.3
July	606	1,238	0	1,844	65.1	54.3	59.5	68.1	2.6	22.2
Aug.	501	1,177	0	1,678	56.4	51.9	54.1	75.6	2.8	23.8
Sept.	324	1,271	0	1,595	55.8	51.0	53.1	67.9	3.0	25.1
Oct.	437	1,214	0	1,651	83.3	49.1	53.2	87.2	2.6	25.4
Nov.	242	1,219	0	1,461	52.1	45.1	48.7	84.7	3.0	25.1
Dec.	504	1,199	0	1,703	63.5	49.8	54.9	75.9	1.3	25.2
Yearly	6,174	15,427	0	21,601	87.9	45.1	59.2	93.0	1.3	24.3

\* Nogales Wash Pumping Plant

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED  
IN MILLIMETERS

Tabulated below are the monthly records of rainfall with averages for their periods of record at stations located in Arizona. Two stations are operated and maintained by the United States Section of the Commission and two by the National Weather Service. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on this page.

IN THE UNITED STATES

Month	San Rafael #2, Arizona		Canelo, Arizona		Patagonia, Arizona		Nogales Sanitation Plant 6N, Arizona			
	2001	Average 1973-2001	2001	Average 1930-2001	2001	Average 1930-2001	2001	Average 1953-2001		
Jan.	51	42	51	32	51	33	38	30		
Feb.	19	37	12	28	20	28	7	22		
Mar.	22	33	22	23	24	25	21	23		
April	55	15	48	11	50	11	41	10		
May	3	8	6	4	4	5	6	6		
June	21	15	35	19	22	13	13	13		
July	157	117	140	104	146	108	59	112		
Aug.	101	108	61	106	75	106	116	107		
Sept.	11	57	34	43	33	44	6	40		
Oct.	11	37	15	28	12	29	31	35		
Nov.	3	24	8	21	13	21	2	17		
Dec.	38	40	33	36	47	37	29	37		
Yearly	492	533	465	455	497	460	369	452		

T Trace

LOCATION OF RAINFALL STATIONS ON THE SANTA CRUZ RIVER WATERSHED

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 2001

IN THE UNITED STATES

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (Meters)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	1,527	1930	R. E. Ewing
Nogales Sanitation Plant 6N, Arizona	S	31° 25'	110° 57'	1,085	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	1,277	1930	George R. Proctor
San Rafael #2, Arizona	S	31° 22'	110° 38'	1,481	Jan. 1973	I. B. & W. C.

S Standard 203 millimeter rain gage

## WESTERN BOUNDARY WATER BULLETIN - 2001 - INTERNATIONAL BOUNDARY AND WATER COMMISSION

TEMPERATURE IN THE SANTA CRUZ RIVER BASIN  
IN DEGREES CELSIUS

Tabulated below are monthly records of temperature at the station located at the Nogales Sanitation Plant in Arizona 14.5 kilometers north of the international boundary. On December 18, 1971, the station was moved to correspond with a new Nogales Sanitation Plant. Prior to this date, the station was located 3.2 kilometers north of the international boundary at the old Nogales Sanitation Plant. This station is operated and maintained by the United States Section of the Commission. The equipment at the Nogales Sanitation Plant - 9N consists of a standard 203-millimeter rain gage and maximum and minimum thermometer. The collection of data for mean relative humidity, evaporation, and mean wind speed was discontinued in 1984.

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

Month	Nogales Sanitation Plant - 9N		
	2001		
	Mean	Max.	Min.
Jan.	6.6	24.4	-6.7
Feb.	8.4	27.2	-5.0
Mar.	11.3	29.4	-2.8
April	15.2	33.3	-2.2
May	20.8	41.7	1.7
June	24.9	41.7	6.7
July	26.3	41.1	16.1
Aug.	25.6	38.9	12.2
Sept.	23.8	37.2	7.8
Oct.	18.6	34.4	2.2
Nov.	13.4	30.6	-7.2
Dec.	6.7	25.0	-8.3
Yearly	16.8	41.7	-8.3

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS  
ALONG SANTA CRUZ RIVER, SAN PEDRO RIVER, AND WHITEWATER DRAW

2001

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 Soil Conservation Service at Douglas, Arizona and estimated from aerial photographs.

Designation of Areas	Drainage Basin-Square Kilometers			Irrigated Areas-Hectares		
	United States	Mexico	Total	United States	Mexico	Total
Santa Cruz River: Above Lochiet, Arizona Gaging Station	212	0	212	40	0	40
Above El Cajon, Mexico Gaging Station	464	324	788	40	952	992
Above Nogales, Arizona Gaging Station	479	901	1,380	40	1,091	1,131
San Pedro River: Above Palominas, Arizona Gaging Station	238	*1,621	1,859	578	1,400	1,978
Whitewater Draw: Above Douglas, Arizona Gaging Station	2,650	0	2,650	8,634	0	8,634

\* An additional 122 square kilometers in Mexico is tributary to the San Pedro River downstream from this station.