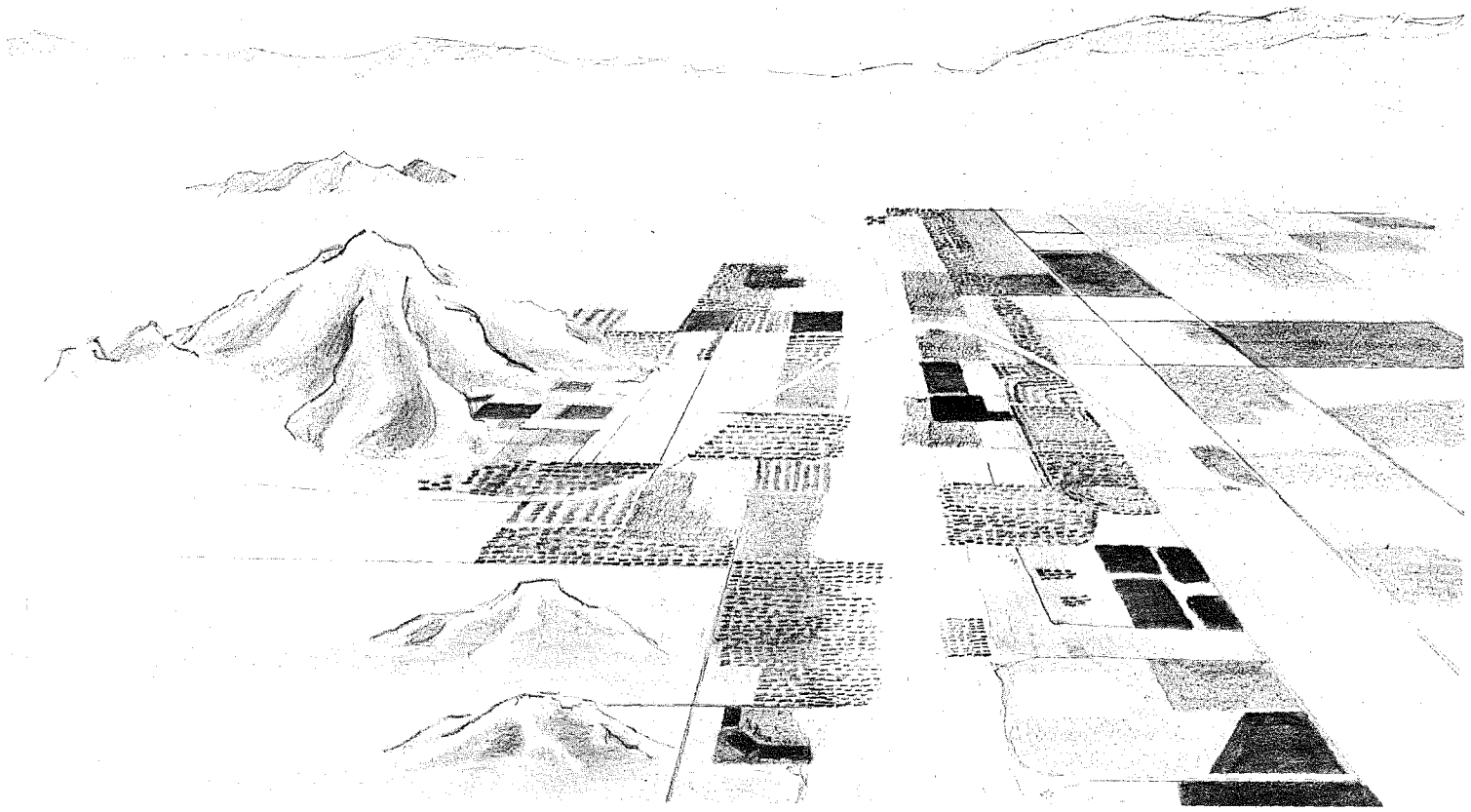
Water-Resources Report Number Thirty – One

ARIZONA STATE LAND DEPARTMENT
Obed M. Lassen, Commissioner

COMPILATION OF FLOOD DATA FOR MARICOPA COUNTY, ARIZONA THROUGH SEPTEMBER 1965

By
L. L. Werho



Prepared by the Geological Survey
United States Department of the Interior
In cooperation with the Flood Control District of Maricopa County, Bureau of Reclamation, and Corps of Engineers

Phoenix, Arizona
June 1967

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COMPILATION OF FLOOD DATA FOR MARICOPA COUNTY, ARIZONA, THROUGH SEPTEMBER 1965

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INTRODUCTION

The population of Maricopa County has increased tremendously in the last 25 years—from 186,000 in 1940 to 875,000 in 1965. The population increase has resulted in the urbanization of large areas, which has caused changes in the natural drainage system. Man has encroached upon the natural waterways, causing many serious flood problems that did not exist a few years ago.

In September 1960, the Flood Control District of Maricopa County entered into a cooperative agreement with the U. S. Geological Survey for the purpose of establishing a network for the collection of hydrologic data in Maricopa County. These data will provide the basis for solving the existing and future flood problems in the area. The investigation is being conducted by the U. S. Geological Survey in cooperation with the Flood Control District of Maricopa County, the Bureau of Reclamation, and the Corps of Engineers. The collection and compilation of the data contained in this report were under the general supervision of H. M. Babcock, district chief of the Water Resources Division of the U. S. Geological Survey in Arizona. The report summarizes the work done during the first 5 years of the investigation and presents basic data collected through September 1965.

The investigation is designed to provide data for analyses of floods. The specific objectives are (1) to determine the magnitude and frequency of floods, (2) to delineate the areas that have been or may be inundated by floods, (3) to determine the duration of flow, lag and concentration times, channel losses, and rate of travel of flood peaks, and (4) to develop, if possible, flood hydrographs and rainfall-runoff relations for different types of watersheds.

INSTRUMENTATION

Instrumentation installed in the first 5 years of the investigation included 48 streamflow-data collection stations—11 equipped with continuous water-stage recorders, 5 equipped with flood-hydrograph recorders and crest-stage gages, and 32 equipped with crest-stage gages—27 recording precipitation gages, and 70 nonrecording precipitation gages. Reliable precipitation data, however, were obtained from only 44 of the nonrecording gages. (See fig. 1.) Data also are available from 11 continuous-recording streamflow stations operated in connection with other investigations and from 55 precipitation gages operated by the U. S. Weather Bureau.

Streamflow Stations

Streamflow gaging-station sites were selected to provide data from specific localities or representative data that could be related to basin parameters to provide areal relations for estimating flood characteristics of ungaged streams. Most of the gaging stations that furnish the latter type of data are in the west half of Maricopa County where little streamflow data have been collected. Some of the factors considered in selecting gaging-station sites were (1) size of drainage basin, (2) physiographic region, (3) altitude, (4) orographic effect, (5) geology, (6) geographic orientation of drainage basin, and (7) rainfall distribution. Many gaging stations were installed at highway culverts; a culvert provides a stable control for which a stage-discharge relation can be defined, and a reliable method exists for indirect determination of peak flows through culverts (Bodhaine, 1963).

Three types of streamflow gages have been installed in Maricopa County—continuous water-stage recorders, flood-hydrograph recorders, and crest-stage gages. The continuous water-stage recorder furnishes a continuous graph showing the water stage with respect to time. The flood-hydrograph recorder also furnishes a continuous graph showing the water stage with respect to time, but it is designed to record only a limited range in stage and a single flood event. The flood-hydrograph recorder makes one revolution every 24 hours, and the date of flow must be determined from other sources—weather records, nearby gaging stations, newspapers, or local information. The crest-stage gage consists of a 2-inch pipe that contains a wooden rod and a small amount of granulated cork. The pipe is closed at both ends except for small intake holes at the bottom and a vent hole at the top, and it is usually mounted vertically in the stream channel. As the water rises in the stream, cork granules float up inside the pipe and adhere to the wooden rod when the water recedes, thus leaving a mark at

PREPARED BY THE U.S. GEOLOGICAL SURVEY IN COOPERATION WITH THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, BUREAU OF RECLAMATION, AND CORPS OF ENGINEERS

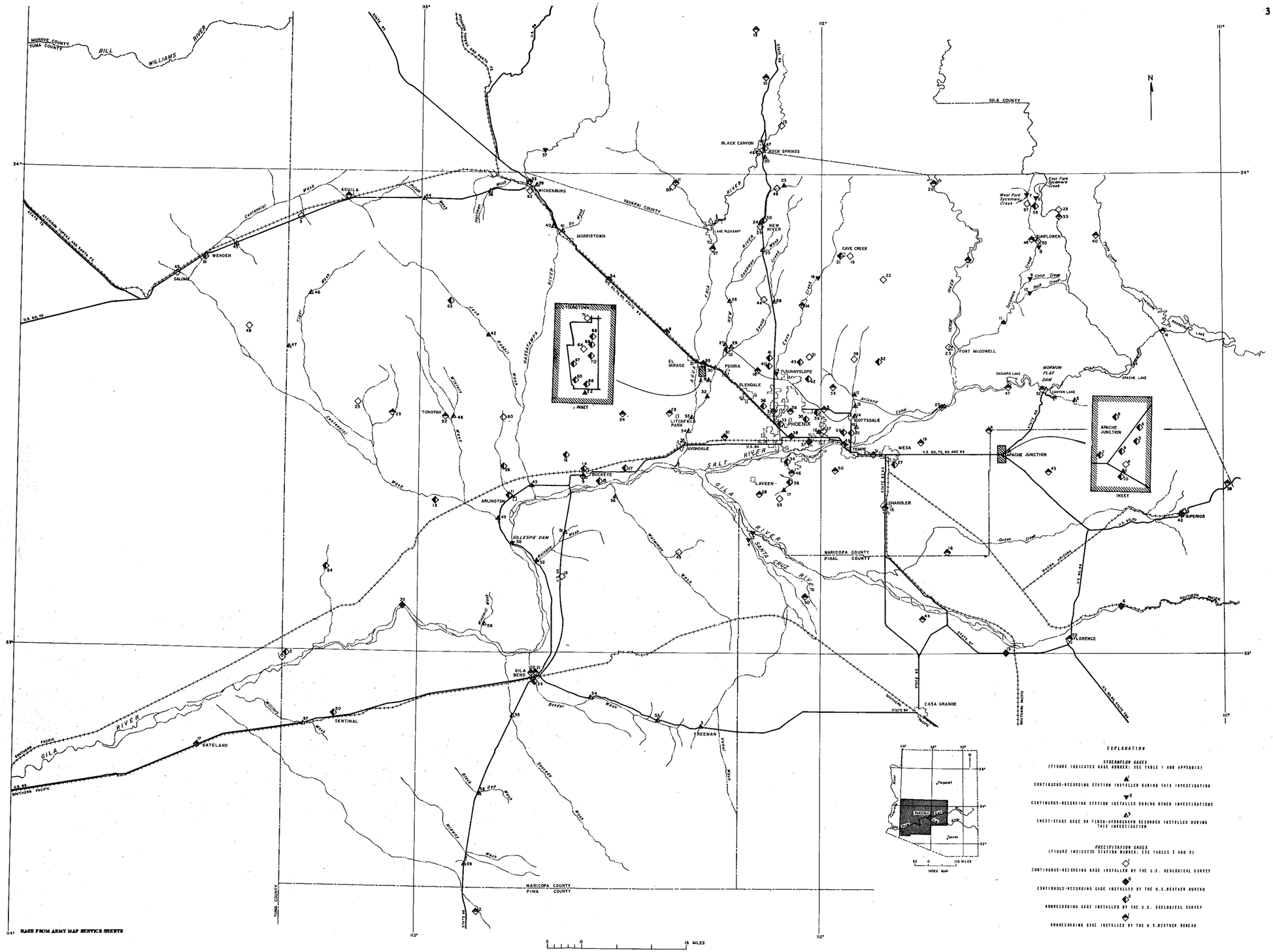

FIGURE 1. -- LOCATIONS OF STREAMFLOW AND PRECIPITATION GAGING STATIONS IN AND NEAR MARICOPA COUNTY.

the peak stage. If two or more peaks occur between inspections, the highest peak will remove any marks left by the preceding lower peaks; therefore, a crest-stage gage may not provide a complete record of all peaks. The dates of the peaks must be determined in the same manner as for the flood-hydrograph recorders.

Nine continuous water-stage recorders were installed in 1960-61. A tenth continuous recorder was installed in an industrial area in 1963, and, in 1964, an additional continuous recorder was installed at the request of the Flood Control District (table 1).

Five flood-hydrograph recorders were installed in 1963. In 1961-62, 15 crest-stage gages were installed; 15 were installed in 1963, and 2 were installed in 1964 (table 1).

Precipitation Stations

Two types of precipitation gages—recording and nonrecording—were installed in areas where the existing Weather Bureau network did not provide the detailed coverage desired. The recording gages give an indication of the length and intensity of storms, and the nonrecording gages give only the amount of precipitation. The recording gages—standard 8-inch weighing-type—record as much as 12 inches of precipitation, and the nonrecording gages—2-1/2- by 2-3/8-inch plastic wedge-shaped containers—collect as much as 6 inches of precipitation. Most of the gages were installed in 1961-62, and several precipitation gages were placed near Youngtown and Apache Junction, where efforts are being made to determine rainfall-runoff relations (fig. 1).

DATA COLLECTION

The streamflow stations are inspected and serviced about once a month, except during storm periods when they are serviced more frequently. Recording rain-gage charts are removed weekly; nonrecording rain gages are read daily during periods of precipitation, and data are submitted to the Geological Survey monthly by observers.

Because the streamflow gages record only water stage, it is necessary to determine the relation between stage and discharge. A curve depicting this relation is known as a discharge rating curve. The rating curve is defined by current-meter measurements and indirect measurements of

Table 1.--Streamflow gaging stations installed through September 1965

[Gage number: number on figure 1 and in appendix]

Gage number	Gaging station	Type		
		Continuous-record station	Flood-hydrograph recorder	Crest-stage gage
1	Queen Creek tributary at Apache Junction, Ariz.	1		
2	Gila River near Laveen, Ariz.	1		
3	Vekol Wash tributary at Freeman, Ariz.			1
4	Santa Cruz River near Laveen, Ariz.	1		
5	Mesquite Creek near Mormon Flat Dam, Ariz.			1
6	East Fork Sycamore Creek near Sunflower, Ariz.	1		
7	West Fork Sycamore Creek near Sunflower, Ariz.	1		
8	Sycamore Creek near Sunflower, Ariz.	1		
9	Camp Creek near Sunflower, Ariz.	1		
10	Rock Creek near Sunflower, Ariz.	1		
11	Sycamore Creek near Fort McDowell, Ariz.	1		
12	Indian Bend Wash near Scottsdale, Ariz.	1		
13	Indian Bend Wash (at McDonald Drive) near Scottsdale, Ariz.			1

Table 1.--Streamflow gaging stations installed through September 1965—Continued

Gage number	Gaging station	Type		
		Continuous-record station	Flood-hydrograph recorder	Crest-stage gage
14	Indian Bend Wash (at Indian School Road) at Scottsdale, Ariz.			1
15	Indian Bend Wash (at McDowell Road) at Scottsdale, Ariz.			1
16	Salt River tributary No. 2 at Phoenix, Ariz.	1		
17	Salt River tributary in South Mountain Park, at Phoenix, Ariz.	1		
18	Cave Creek near Cave Creek, Ariz.	1		
19	Cave Creek at Phoenix, Ariz.	1		
20	Agua Fria River tributary No. 2 near Rock Springs, Ariz.			1
21	Agua Fria River (at Grand Avenue) at El Mirage, Ariz.			1
22	Agua Fria River tributary at Youngtown, Ariz.	1		
23	New River near Rock Springs, Ariz.		1	1
24	New River near Black Canyon, Ariz.	1		
25	Deadman Wash (at Black Canyon Highway) near New River, Ariz.			1

Table 1.--Streamflow gaging stations installed through September 1965—Continued

Gage number	Gaging station	Type		
		Continuous-record station	Flood-hydrograph recorder	Crest-stage gage
26	New River (at Keefer Hill) near Phoenix, Ariz.			1
27	New River (at Bell Road) near Peoria, Ariz.		1	1
28	Skunk Creek (at Black Canyon Highway) near Phoenix, Ariz.			1
29	Skunk Creek (above Arizona Canal) near Peoria, Ariz.			1
30	New River (at Grand Avenue) at Peoria, Ariz.			1
31	New River (at Olive Avenue) near Peoria, Ariz.			1
32	New River (at Glendale Avenue) near Glendale, Ariz.	1		
33	Agua Fria River (at Indian School Road) near Litchfield Park, Ariz.			1
34	Agua Fria River (at McDowell Road) near Avondale, Ariz.			1
35	Agua Fria River (at Buckeye Road) at Avondale, Ariz.			1
36	Waterman Wash near Buckeye, Ariz.			1
37	Hassayampa River at Box damsite, near Wickenburg, Ariz.	1		

Table 1.--Streamflow gaging stations installed through September 1965—Continued

Gage number	Gaging station	Type		
		Continuous-record station	Flood-hydrograph recorder	Crest-stage gage
38	Hartman Wash near Wickenburg, Ariz.			1
39	Hassayampa River at Wickenburg, Ariz.			1
40	Hassayampa River near Morristown, Ariz.			1
41	Ox Wash near Morristown, Ariz.		1	1
42	Jack Rabbit Wash near Tonopah, Ariz.			1
43	Hassayampa River near Arlington, Ariz.	1		
44	Prison Wash near Wickenburg, Ariz.			1
45	Centennial Wash tributary near Salome, Ariz.			1
46	Tiger Wash near Aguila, Ariz.			1
47	Tiger Wash, west channel, near Salome, Ariz.			1
48	Winters Wash near Tonopah, Ariz.		1	1
49	Centennial Wash near Arlington, Ariz.	1		
50	Gila River below Gillespie Dam, Ariz.	1		

Table 1.--Streamflow gaging stations installed through September 1965—Continued

Gage number		Type		
		Continuous-record station	Flood-hydrograph recorder	Crest-stage gage
51	Rainbow Wash tributary near Buckeye, Ariz.			1
52	Rainbow Wash near Gila Bend, Ariz.	1		
53	Bender Wash tributary near Gila Bend, Ariz.			1
54	Bender Wash near Gila Bend, Ariz.			1
55	Sauceda Wash near Gila Bend, Ariz.			1
56	Windmill Wash near Gila Bend, Ariz.			1
57	Military Wash near Sentinel, Ariz.			1
58	Black Gap Wash near Ajo, Ariz.		1	1
59	Crater Range Wash near Ajo, Ariz.			1

the discharge or only by indirect measurements when it is not possible to make current-meter measurements. An indirect measurement is one in which the discharge is computed from hydraulic formulas using water-surface elevations, channel geometry, and channel roughness. Water-surface elevations generally are determined by running levels to debris lines left by a flood. Indirect measurements were used frequently in this study, because the short duration of the peak flows in desert washes makes it difficult to obtain current-meter measurements.

Ratings have been defined partially for most of the stations, but many of them need better definition. Discharges given in this report were determined either from indirect measurements or from rating curves. Some discharges may be revised at a later date, when additional discharge measurements have been made and a more accurate rating curve is developed. Measurements of peak discharges at miscellaneous sites for unusual floods will be used to supplement the data obtained at the gaging station.

PRESENTATION OF DATA

Peak-flow data collected at the 48 gages installed for this study and at 11 gages installed for other studies in Maricopa County through September 1965 are given in the appendix. Since 1961, daily and monthly streamflow data for continuous-recording stations and peak discharges at miscellaneous sites have been published annually in "Surface water records of Arizona." Similar records prior to 1961 were published in the water-supply paper series "Surface-water supply of the United States, pt. 9, Colorado River basin."

Precipitation data are not given in this report but can be obtained from files of the U. S. Geological Survey. General information for gages operated by the Geological Survey is given in table 2, and the U. S. Weather Bureau stations are listed in table 3.

Records collected at gaging stations on the Agua Fria River and its tributaries show that much surface flow disappears as floodwater moves downstream from the mountains. Most of the peak flows recorded at the New River near Black Canyon gaging station (fig. 1, No. 24) never reach the mouth of the Agua Fria River. The appendix gives 25 peaks for the New River gage, and only 6 of these were recorded at Agua Fria River (at Buckeye Road) at Avondale (fig. 1, No. 35). The peak flows that reached Buckeye Road were greatly reduced in magnitude. The flood of August 16, 1963, is an example of the reduction in flood magnitude between these two stations. During this flood, the peak flow of 4,620 cfs (cubic feet per second) at New

Table 2.--Precipitation stations operated by the U. S. Geological Survey in and near Maricopa County

[See figure 1. Gage: R, recording gage; N, nonrecording gage]

Station number	Station name	Type of gage	Period of record	Location	Observer
1	Agua Caliente	R	5-62 to	In sec. 18, T. 5 S., R. 10 W., at Agua Caliente	Lote Conde
2	Agua Caliente No. 2	N	3-61 to 2-62	In sec. 19, T. 5 S., R. 10 W., at Agua Caliente	Jay Vander Wall
3	Aguila 7 W	R	6-61 to	In sec. 33, T. 7 N., R. 10 W., 7 miles west of Aguila	G. B. Huthmacher
4	Apache Junction No. 1	R	8-61 to	In sec. 21, T. 1 N., R. 8 E., at Apache Junction	L. L. Clevenger
5	Apache Junction No. 2	N	10-61 to	In $SW\frac{1}{4}NW\frac{1}{4}$ sec. 15, T. 1 N., R. 8 E., $1\frac{3}{4}$ miles northeast of Apache Junction	K. C. Schabinger
6	Apache Junction No. 3	N	10-61 to 9-62	In $NE\frac{1}{4}NW\frac{1}{4}$ sec. 15, T. 1 N., R. 8 E., at Apache Junction	A. R. Damiano
7	Apache Junction No. 4	N	10-61 to 9-62	In $SW\frac{1}{4}NE\frac{1}{4}$ sec. 20, T. 1 N., R. 8 E., at Apache Junction	L. S. Claxton
8	Apache Junction No. 5	N	10-61 to 3-63	In $N\frac{1}{2}SW\frac{1}{4}SE\frac{1}{4}SW\frac{1}{4}$ sec. 4, T. 1 N., R. 8 E., $2\frac{1}{2}$ miles north of Apache Junction	Peter Tosko
9	Apache Junction No. 6	N	10-61 to 3-65	In $W\frac{1}{2}S\frac{1}{2}NW\frac{1}{4}SW\frac{1}{4}NE\frac{1}{4}$ sec. 21, T. 1 N., R. 8 E., at Apache Junction	D. R. Kelchner
10	Apache Junction No. 7	N	11-61 to 7-62	In $SW\frac{1}{4}$ sec. 21, T. 1 N., R. 8 E., at Apache Junction	J. S. Crowley
11	Arlington	N	5-61 to 9-62	In sec. 21, T. 1 S., R. 5 W., at Arlington	Thomas Boyer
12	Arlington 11W	N	5-61 to 3-64	In sec. 27, T. 1 S., R. 7 W., 11 miles west of Arlington	Robert K. Coker
13	Black Canyon 4 NE	R	5-62 to	In sec. 24, T. 9 N., R. 2 E., 4 miles northeast of Black Canyon City	J. A. Gabriel
14	Buckeye	N	8-62 to	In $SW\frac{1}{4}$ sec. 32, T. 1 N., R. 3 W., at Buckeye	James W. Rogers
15	Buckeye 3 E	N	8-62 to 11-64	In sec. 10, T. 1 S., R. 3 W., 3 miles east of Buckeye	James W. Rogers
16	Buckeye 4 NW	N	5-61 to	In sec. 23, T. 1 N., R. 4 W., 4 miles northwest of Buckeye	E. H. Barron
17	Buckeye 6 E	N	7-61 to 2-62	In sec. 32, T. 1 N., R. 2 W., 6 miles east of Buckeye	Mrs. Ivan Rex
18	Buckeye 15 S	R	6-61 to	In sec. 23, T. 3 S., R. 4 W., 15 miles south of Buckeye	S. W. Hansen
19	Carefree	R	7-64 to	On line between secs. 26 and 35, T. 6 N., R. 4 E., at Carefree	U. S. Forest Service
20	Castle Hot Springs	R	7-63 to 9-64	In sec. 4, T. 7 N., R. 1 W., 19 miles northeast of Morristown	Canuto Rodriquez
21	Cave Creek	N	4-61 to 10-64	In sec. 27, T. 6 N., R. 4 E., at Cave Creek	Jack Cartwright Ranch
22	Cave Creek 7 SE	R	2-62 to 12-64	In sec. 16, T. 5 N., R. 5 E., 7 miles southeast of Cave Creek	D. C. Ranch
23	Fort McDowell	R	5-62 to	In sec. 18, T. 3 N., R. 7 E., at Fort McDowell	City of Phoenix
24	Gila Bend	N	2-62 to 8-64	In sec. 31, T. 5 S., R. 4 W., at Gila Bend	Jay Vander Wall
25	Harquahala Valley	R	6-61 to 5-62	In sec. 14, T. 2 N., R. 9 W., 31 miles south of Aguila	Mary E Ranch
26	Hassayampa 3 NW	N	5-61 to	In sec. 32, T. 1 N., R. 5 W., 3 miles northwest of Hassayampa	Martin Nerad
27	Mesa	N	9-64 to	In sec. 22, T. 1 N., R. 5 E., at Mesa	Jay Vander Wall
28	Mount Ord	R	11-62 to	In sec. 35, T. 7 N., R. 9 E., 6 miles northeast of Sunflower	U. S. Geological Survey
29	New River	R	12-62 to	In sec. 3, T. 6 N., R. 2 E., at New River	J. A. Jacka
30	New River No. 2	N	4-61 to 3-63	In sec. 34, T. 7 N., R. 2 E., at New River	Smithart Service Station
31	Paradise Valley	R	5-63 to	In sec. 11, T. 3 N., R. 3 E., 11 miles north of downtown Phoenix	P. C. Briggs
32	Peoria 4 N	N	7-61 to 9-63	In $NE\frac{1}{4}NE\frac{1}{4}$ sec. 3, T. 3 N., R. 1 E., 4 miles north of Peoria	Bodine Ranch
33	Phoenix 1 N	N	1-62 to	In $SW\frac{1}{4}$ sec. 32, T. 2 N., R. 3 E., at Phoenix	O. E. Leppanen
34	Phoenix 4 S	N	8-63 to 7-65	In sec. 29, T. 1 N., R. 3 E., at Phoenix	Fred Combs
35	Phoenix 4 NE	N	6-61 to 8-63	In $SW\frac{1}{4}NE\frac{1}{4}$ sec. 22, T. 2 N., R. 3 E., at Phoenix	Town and Country Golf Course
36	Phoenix $5\frac{1}{2}$ NW	N	4-61 to 11-64	In $SE\frac{1}{4}$ sec. 15, T. 2 N., R. 2 E., at Phoenix	Marvin Ayres
37	Phoenix 6 E	R	12-63 to	In $SW\frac{1}{4}NW\frac{1}{4}$ sec. 5, T. 1 N., R. 4 E., at Phoenix	U. S. Geological Survey
38	Phoenix 6 S	N	4-61 to	In sec. 8, T. 1 S., R. 3 E., at Phoenix	Dr. C. L. Cline
39	Phoenix 6 NE	N	4-63 to	In $NW\frac{1}{4}$ sec. 24, T. 2 N., R. 3 E., at Phoenix	Ruth Bellinoff
40	Phoenix $10\frac{1}{2}$ NNW	N	8-63 to	In sec. 13, T. 3 N., R. 2 E., at Phoenix	D. S. Goodwin
41	Phoenix 11 NNW	N	7-61 to	In sec. 14, T. 3 N., R. 2 E., at Phoenix	L. L. Werho

Table 2.--Precipitation stations operated by the U. S. Geological Survey in and near Maricopa County—Continued

Station number	Station name	Type of gage	Period of record	Location	Observer
42	Phoenix 11 NE	N	4-61 to	In sec. 34, T. 3 N., R. 3 E., at Phoenix	R. J. Roberts
43	Phoenix 11 NNE	N	8-62 to	In sec. 15, T. 3 N., R. 3 E., at Phoenix	George Potts
44	Phoenix 20 N	R	5-62 to	In $SE\frac{1}{4}NW\frac{1}{4}$ sec. 35, T. 5 N., R. 2 E., 20 miles north of Phoenix	Ralph Ackzen
45	Rainbow Valley	R	10-64 to	In sec. 34, T. 2 S., R. 1 W., 12 miles north of Mobile	James Tundland
46	Rock Springs	R	10-64 to	In sec. 10, T. 8 N., R. 2 E., in Rock Springs	Bob Warner
47	Rock Springs No. 2	N	4-61 to 10-64	In sec. 10, T. 8 N., R. 2 E., at Rock Springs	Rock Springs Store
48	Rock Springs 7 SE	R	6-61 to 11-62	In sec. 12, T. 7 N., R. 2 E., 7 miles southeast of Rock Springs	Cline Ranch
49	Salome 13 SE	R	5-62 to	In sec. 15, T. 4 N., R. 11 W., 10 miles southeast of Salome	Joe Haser
50	Sentinel	N	5-61 to 9-62	In sec. 32, T. 6 S., R. 9 W., at Sentinel	John Chudy
51	Scottsdale 3 S	N	7-61 to	In $SW\frac{1}{4}$ sec. 2, T. 1 N., R. 4 E., at Scottsdale	V. V. Higginbotham
52	Scottsdale 8 N	N	5-61 to	In sec. 16, T. 3 N., R. 5 E., 8 miles north of Scottsdale	D. E. Campbell
53	South Mountain Park	R	10-61 to	In sec. 18, T. 1 S., R. 3 E., at Phoenix	City of Phoenix
54	Sundad	N	5-62 to 9-63	In sec. 7, T. 3 S., R. 9 W., in Sundad	Laverne Reese
55	Sunflower	R	6-61 to	In $NW\frac{1}{4}$ sec. 17, T. 6 N., R. 9 E., at Sunflower	Sunflower Store
56	Sunflower $5\frac{1}{2}$ N	N	7-64 to	In $NW\frac{1}{4}NE\frac{1}{4}$ sec. 19, T. 7 N., R. 9 E., $5\frac{1}{2}$ miles north of Sunflower (Jenella Mines)	C. O. Carlson
57	Sunflower 6 NW	R	11-63 to	In sec. 13, T. 7 N., R. 8 E., 6 miles northwest of Sunflower	U. S. Geological Survey
58	Tempe	N	7-61 to 3-65	In $NW\frac{1}{4}SE\frac{1}{4}$ sec. 3, T. 1 N., R. 4 E., at Tempe	E. E. Denis
59	Thunderbird Airport	R	10-61	In sec. 14, T. 3 N., R. 4 E., 8 miles north of Scottsdale	Thunderbird Academy
60	Tonopah 9 E	R	5-62 to	In sec. 29, T. 2 N., R. 5 W., 9 miles east of Tonopah	Lewis A. Shearer
61	Wenden	N	5-62 to	In $NE\frac{1}{4}$ sec. 31, T. 6 N., R. 12 W., at Wenden	Robert Morrow
62	Wickenburg	R	6-64 to	In sec. 12, T. 7 N., R. 5 W., in Wickenburg	Ray Douglas
63	Wickenburg 20 SW	N	5-61 to	In sec. 31, T. 5 N., R. 6 W., 20 miles southwest of Wickenburg	Hovis Ranch
64	Youngtown No. 1	R	10-61 to 7-63	In sec. 19, T. 3 N., R. 1 E., at 11363 112th Street South, Youngtown	Harry Jones
65	Youngtown No. 2	N	4-61 to	In $SE\frac{1}{4}SW\frac{1}{4}$ sec. 19, T. 3 N., R. 1 W., at Youngtown	A. Doremus
66	Youngtown No. 3	N	4-61 to 2-64	In $SE\frac{1}{4}SE\frac{1}{4}$ sec. 19, T. 3 N., R. 1 W., at Youngtown	F. M. Peeler
67	Youngtown No. 4	N	10-61 to	In $SE\frac{1}{4}SE\frac{1}{4}$ sec. 19, T. 3 N., R. 1 W., at Youngtown	F. B. Applegate
68	Youngtown No. 5	N	10-61 to	In $SE\frac{1}{4}NE\frac{1}{4}$ sec. 19, T. 3 N., R. 1 W., at Youngtown	H. H. Hicks
69	Youngtown No. 6	N	10-61 to	In $NE\frac{1}{4}SW\frac{1}{4}$ sec. 19, T. 3 N., R. 1 W., at Youngtown	G. M. Duren
70	Youngtown No. 7	N	10-61 to	In $SE\frac{1}{4}SW\frac{1}{4}$ sec. 19, T. 3 N., R. 1 W., at Youngtown	Julian LeSuer
71	Youngtown Townhall	R	7-63 to	In sec. 19, T. 3 N., R. 1 W., at Youngtown Townhall	Harry K. Thompson

Table 3.--Precipitation stations operated by the U. S. Weather Bureau in and near Maricopa County

[See figure 1; U. S. Weather Bureau, issued annually]

Station number	Station name	Station number	Station name
1	Aguila	29	Litchfield Park
2	Ajo Well	30	Maricopa 4 N
3	Alhambra 2 NE	31	Mesa Experiment Farm
4	Apache Junction 4 N NW	32	Mormon Flat
5	Arizona Falls	33	Mount Ord Lookout
6	Ashurst-Hayden Dam	34	Paradise Valley
7	Bartlett Dam	35	Painted Rock Dam
8	Beardsley	36	Phoenix Indian School
9	Buckeye	37	Phoenix Weather Bureau Airport
10	Bumble Bee		
11	Castle Hot Springs Hotel	38	Phoenix Post Office
12	Cordes	39	Pinal Ranch
13	Casa Grande National Monument	40	Reno Ranger Station
		41	Roosevelt 1 W NW
14	Cave Creek Dam	42	Superior
15	Chandler	43	Superstition Mountain
16	Chandler Heights	44	Sacaton
17	Dateland	45	Salome
18	Deer Valley	46	South Phoenix
19	Falcon Field	47	Stewart Mountain Dam
20	Florence	48	Sunflower
21	Gila Bend	49	Tempe
22	Gila Bend Aviation	50	Tempe Citrus Experiment Station
23	Granite Reef		
24	Griggs 3 W	51	Tolleson
25	Harquahala Plains No. 1	52	Tonopah
26	Horseshoe Dam	53	Wickenburg
27	Lake Pleasant	54	Wittman
28	Laveen 3 S SE	55	Youngtown

River near Black Canyon was reduced to 63 cfs at Agua Fria River (at Buckeye Road) at Avondale. The volume of flow past the Black Canyon gage during this flood was 540 acre-feet, and although there was some tributary inflow from Deadman Wash and Skunk Creek, the flow past Buckeye Road was only a few acre-feet. Similar losses probably occur during every flood.

REVIEW OF THE INVESTIGATION

The rate of travel of flood peaks, areas inundated, and channel losses were obtained for flows in the Salt River below Granite Reef Dam in April 1965 (Briggs and Werho, 1966) and December 1965 to January 1966 (Aldridge, 1966). Aerial photographs were made of the December 1965 to January 1966 flood in the Salt River, and mosaics covering a 25-mile reach of channel from above Oak Street near Mesa to below 51st Avenue in Phoenix were prepared from the aerial photographs.

An evaluation of the data collected in the first 5 years of this investigation reveals certain deficiencies in the data and the instrumentation. The data seem to be inadequate for any large-scale study of rainfall-runoff relations; however, rainfall-runoff relations may be obtained for the small areas near Apache Junction and Youngtown.

The data from four continuous-streamflow stations are inadequate for determining the volume of flow, because the stream beds are extremely unstable and the stage-discharge relations for low stages often change considerably as a result of each flood. Therefore, in the future, only peak discharges will be given in the "Surface water records of Arizona" (issued annually) for the following stations:

New River (at Glendale Avenue) near Glendale
Hassayampa River near Arlington
Rainbow Wash near Gila Bend.

The gaging station on Salt River tributary No. 2 at Phoenix, where the flow from an industrial area was measured, was removed to make way for new industrial development.

The operation of rain gages, especially the nonrecording type, has been found to be much more expensive than was originally estimated. In order to evaluate the data obtained from these gages, the author prepared isohyetal maps for three storm periods—August 26-30, 1951, described by Sellers (1960, p. 23) as "perhaps the heaviest storm to hit Arizona in the past fifty years"; July 30-August 2, 1964; and January 5-8, 1965. The latter two storms were the largest summer and winter storms, respectively,

in Maricopa County from October 1960 to September 1965. The data from the nonrecording rain gages contributed little to the accuracy or refinement of the isohyetal maps; therefore, the nonrecording rain gages, except those in the special study areas at Youngtown and Apache Junction, have been discontinued.

A method for predicting the magnitude and frequency of floods from large watersheds was developed by Patterson and Somers (1966) for the mountainous areas in Maricopa County. At least 5 more years of streamflow data will be needed, however, before these methods can be extended into the desert areas and small watersheds.

APPENDIX—GAGING-STATION RECORDS

The peak-discharge data given in this section for the 1965 water year and for earlier years at some gaging stations are preliminary and are subject to revision. A water year is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ended September 30, 1965, is called the "1965 water year" (Langbein and Iseri, 1960, p. 21).

Dates listed for peaks at crest-stage and flood-hydrograph stations are determined, as near as possible, from rainfall records, field notes, and other sources. Where a range in time (August 1-14) is listed in the date column, it means that the peak occurred between the listed dates and does not mean that the peak lasted for the full time. The records give some peaks that occurred prior to the installation of the gaging station. These either are from indirect measurements made prior to the installation of the gage, or they have been computed by using high-water marks and the rating developed during the period of gaging-station operation.

The explanation of the items underlined in the records is as follows:

(1) An underline in the "water-year" column means a discontinuous record.

(2) An underline beginning at the "date" column and continuing through the "discharge" column means a change in site and datum.

(3) An underline in the "gage-height" column means a change in datum.

No underlines are used for changes in site or datum if records have been adjusted to present conditions.

The records include discharges for maximum yearly peaks and for those peaks that exceed a selected minimum called "base discharge." For continuous-recording stations, the base discharge is that which will be exceeded on an average of about three times a year. For crest-stage gages and flood-hydrograph recorders, the base discharge is generally the minimum that can be recorded by the gage; for a few stations, however, the base discharge has been determined in the same manner as that for the continuous-recording stations. The lower of two peaks occurring within a 48-hour period has not been listed, unless the recession between it and the higher peak has been shown to be sufficient to indicate that the peaks resulted from independent storms.

When gages were installed at several of the sites in the Agua Fria River basin, high-water marks from an earlier flood were found. These marks are probably from the flood of December 25-26, 1959, which, in general, was the highest flood in the area since 1951. Peak discharges have been determined from extensions of stage-discharge relations used for the period of record. No attempt was made to obtain data for lower peaks that may have occurred between December 1959 and the installation of the gage.

For several stations, only the annual peaks are given for some years. The annual peak is defined as the maximum momentary discharge that occurred during the water year.

1. Queen Creek tributary at Apache Junction, Ariz.

Location. --Lat 33°24'37", long 111°32'27", in NE¼SW¼ sec. 21, T. 1 N., R. 8 E., at culvert on U. S. Highway 60, 70, 80, 89, 0.6 mile southeast of Apache Junction.

Drainage area. --0.51 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,711.83 ft above mean sea level.

Remarks. --Base discharge, 20 cfs. Stage-discharge relation defined by current-meter measurement below 9 cfs and above by theoretical rating for culvert.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	July 4, 1961	3.36	113	1964	Oct. 19, 1963	1.93	25
	July 30, 1961	3.02	90		Nov. 7, 1963	1.91	24
	Aug. 18, 1961	4.28	179		Nov. 21, 1963	2.53	61
					Sept. 14, 1964	2.75	74
1962	Nov. 21, 1961	2.16	39				
				1965	Aug. 17, 1965	1.06	1.7
1963	Aug. 17, 1963	2.26	46				

2. Gila River near Laveen, Ariz.

Location. --Lat 33°15'25", long 112°09'59", in SW¼NW¼ sec. 16, T. 2 S., R. 2 E., in Gila River Indian Reservation, at highway bridge, 2.6 miles south of Komatke, and 7.3 miles south of Laveen.

Drainage area. --20,615 sq mi, of which 7,729 sq mi is below Coolidge Dam.

Gage. --Water-stage recorder above concrete diversion dam. Datum of gage is 1,018.90 ft above mean sea level, datum of 1929, supplementary adjustment of 1949. Since Oct. 16, 1940, supplementary staff gage or water-stage recorder on overflow channel at highway bridge a quarter of a mile south at datum 0.23 ft lower.

Remarks. --Base discharge, 700 cfs. Peak discharges represent runoff from drainage area below Coolidge Dam and may be slightly affected by irrigation diversions. Stage-discharge relation for both channels defined by current-meter measurements below 1,800 cfs and extended above by logarithmic plotting. Relation is complex because of operational procedures at the diversion dam prior to August 1957 and because of shifting control during flood periods.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1940	Aug. 17, 1940	9.21	8,740	1951	Aug. 5, 1951	6.93	1,100
					Aug. 29, 1951	7.29	1,210
1941	Nov. 20, 1940	5.75	1,610				
	Dec. 26, 1940	5.49	1,440	1952	Jan. 15, 1952	6.70	871
	Jan. 2, 1941	9.33	11,900		Jan. 20, 1952	7.03	1,070
	Jan. 13, 1941	5.08	1,040				
	Jan. 30, 1941	5.72	1,720	1953	July 31, 1953	6.76	565
	Feb. 9, 1941	6.19	1,830				
	Feb. 26, 1941	5.21	1,600	1954	Mar. 26, 1954	6.81	774
	Mar. 17, 1941	7.80	4,710		July 23, 1954	7.64	1,440
	July 24, 1941	5.00	1,420		Aug. 4, 1954	7.98	1,990
	Aug. 11, 1941	5.42	1,730		Aug. 8, 1954	9.18	4,510
	Aug. 18, 1941	5.43	1,750		Aug. 15, 1954	7.75	1,300
	Sept. 19, 1941	5.14	1,560		Aug. 17, 1954	7.93	1,580
	Sept. 29, 1941	5.62	1,800		Aug. 21, 1954	7.87	1,520
					Sept. 26, 1954	7.33	764
1942	Dec. 12, 1941	4.90	1,170				
				1955	July 27, 1955	8.14	2,100
1943	Jan. 25, 1943	4.68	714		Aug. 1, 1955	8.08	1,900
	Mar. 6, 1943	5.13	1,550		Aug. 5, 1955	7.90	1,630
	Aug. 4, 1943	4.70	702		Aug. 10, 1955	8.54	2,700
	Aug. 11, 1943	5.41	1,470		Aug. 17, 1955	7.66	1,060
	Aug. 15, 1943	4.70	730		Aug. 24, 1955	8.76	3,230
	Sept. 27, 1943	5.78	1,570				
				1956	Jan. 31, 1956	4.00	46
1944	Aug. 11, 1944	5.83	1,330				
				1957	Aug. 20, 1957	6.0	446
1945	Aug. 13, 1945	7.42	2,800				
				1958	Aug. 9, 1958	7.73	983
1946	Oct. 6, 1945	5.63	1,250		Aug. 19, 1958	7.75	995
	Aug. 6, 1946	5.76	1,180				
	Sept. 20, 1946	6.26	1,260	1959	Aug. 19, 1959	7.54	934
1948	July 26, 1948	5.70	1,280	1960	Nov. 1, 1959	7.70	1,080
	Aug. 5, 1948	6.09	1,430		Dec. 28, 1959	8.12	1,680
					Jan. 14, 1960	8.18	1,760
1949	July 25, 1949	6.22	880				
	Aug. 1, 1949	5.90	755	1961	Aug. 25, 1961	7.19	655
	Aug. 10, 1949	6.64	1,250				
	Sept. 14, 1949	5.96	776	1962	Dec. 18, 1961	7.75	1,020
	Sept. 17, 1949	6.68	1,210				
				1963	Feb. 14, 1963	7.63	798
1950	July 9, 1950	5.72	706				
	July 19, 1950	6.08	777	1964	Aug. 17, 1964	7.96	996
	July 23, 1950	6.80	1,040		Sept. 17, 1964	7.83	827
	Aug. 2, 1950	7.22	1,500				
	Aug. 6, 1950	7.02	1,160	1965	Feb. 9, 1965	4.09	85

3. Vekol Wash tributary at Freeman, Ariz.

Location. --Lat 32°50'43", long 112°17'24", in NE¼SE¼ sec. 6, T. 7 S., R. 1 E., on right bank at old highway 100 ft upstream from Interstate 8, half a mile east of Freeman, and 31 miles west of Casa Grande.

Drainage area. --9.91 sq mi.

Gage. --Crest-stage gage installed June 19, 1963. Datum of gage is 1,761.00 ft above mean sea level.

Remarks. --Stage-discharge relation not defined. Point of zero flow 1.20 ft gage datum, approximately. Station discontinued Sept. 30, 1965.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1963	August 1963	2.55	1965	January or February, 1965	2.26
	August or September, 1963	2.10		July 21-Aug. 20, 1965	2.79
1964	Aug. 1, 1964	2.86		Sept. 2, 1965	3.14
	Aug. 4-14, 1964	2.30			
	Sept. 10, 1964	3.99			

4. Santa Cruz River near Laveen, Ariz.

Location. --Lat 33°13'56", long 112°10'08", in NE¼NE¼ sec. 29, T. 2 S., R. 2 E., in Gila River Indian Reservation, at highway bridge, 3.4 miles upstream from mouth, 4.3 miles south of Komatke, and 9 miles south of Laveen.

Drainage area. --8,581 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,020.86 ft above mean sea level, datum of 1929, Phoenix-Picacho supplementary adjustment of 1949.

Remarks. --Base discharge, 380 cfs. Peak discharges affected by spreading operations and diversions for irrigation. Main channel relation defined by current-meter measurements. High-stage flow in bypass channel is estimated.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1940	Aug. 17, 1940	7.88	743	1952	July 28, 1952	11.57	805
	Sept. 18, 1940	9.30	1,200		Aug. 15, 1952	14.38	1,860
1941	Nov. 20, 1940	6.87	536	1953	Nov. 16, 1952	9.54	425
	Jan. 2, 1941	9.08	1,230		Nov. 18, 1952	10.46	538
	Mar. 2, 1941	6.12	384		July 17, 1953	9.05	380
	Mar. 6, 1941	7.05	548		July 17, 1953	10.43	555
	Mar. 15, 1941	10.03	1,580				
	Apr. 13, 1941	8.05	908	1954	Aug. 9, 1954	11.50	726
	July 25, 1941	8.32	950				
	Aug. 7, 1941	7.50	720	1955	Aug. 10, 1955	15.56	2,180
	Aug. 30, 1941	5.97	384				
				1956	Jan. 30, 1956	6.64	90
1942	Dec. 11, 1941	6.11	413				
	Jan. 2, 1942	5.97	384	1957	Aug. 20, 1957	12.40	1,040
	July 15, 1942	11.61	1,890				
	Aug. 5, 1942	7.19	551	1958	Nov. 3, 1957	16.10	3,360
					Feb. 7, 1958	14.37	1,910
1943	Aug. 1, 1943	6.42	390		Mar. 15, 1958	10.08	382
	Aug. 18, 1943	7.02	480		June 22, 1958	12.30	910
	Sept. 25, 1943	7.46	563		Aug. 1, 1958	11.99	797
	Sept. 28, 1943	10.01	1,200		Sept. 12, 1958	12.51	994
1944	Feb. 25, 1944	5.10	217	1959	July 15, 1959	11.18	500
					Aug. 2, 1959	11.76	632
1945	July 31, 1945	7.61	488		Aug. 3, 1959	10.7	426
	Aug. 3, 1945	8.28	592		Aug. 12, 1959	16.03	3,010
	Aug. 11, 1945	10.79	1,200		Aug. 18, 1959	15.60	2,740
1946	Oct. 5, 1945	6.87	390	1960	Dec. 25, 1959	10.46	393
	July 18, 1946	9.50	840		Jan. 15, 1960	11.97	707
	Sept. 21, 1946	16.70	5,020				
				1961	Aug. 15, 1961	11.56	547
1948	Aug. 7, 1948	11.85	a 1,200				
				1962	Sept. 29, 1962	17.50	9,200
1949	Aug. 6, 1949	12.58	1,400				
	Sept. 11, 1949	9.56	565	1963	Aug. 17, 1963	11.91	608
	Sept. 15, 1949	12.59	1,280				
	Sept. 17, 1949	13.61	1,780	1964	Oct. 18, 1963	11.02	422
					July 27, 1964	12.54	771
1950	Aug. 3, 1950	8.36	428		Aug. 3, 1964	14.43	1,610
	Aug. 11, 1950	10.20	685		Aug. 14, 1964	15.42	2,520
					Aug. 27, 1964	11.32	504
1951	July 28, 1951	9.50	502		Sept. 14, 1964	13.67	1,280
	Aug. 4, 1951	13.83	1,510				
	Aug. 7, 1951	15.73	2,810	1965	June 17, 1965	10.18	309
	Aug. 15, 1951	9.79	527				
	Aug. 28, 1951	17.00	5,060				

a Annual peak only.

5. Mesquite Creek near Mormon Flat Dam, Ariz.

Location. --Lat 33°32'00", long 111°22'10", T. 2 N., R. 10 E., in Tonto National Forest, at culvert on State Highway 88, 2 miles east of Tortilla Flat, 5 miles east of Mormon Flat Dam, and 20 miles northeast of Apache Junction.

Drainage area. --4.31 sq mi.

Gage. --Crest-stage gage installed Aug. 2, 1963. Altitude of gage is 1,880 ft (from topographic map).

Remarks. --Base discharge, 100 cfs. Stage-discharge relation defined by computations of flow through culvert at 989, 1,120, and 2,200 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	August 1963	7.09	989	1965	Jan. 20, 1965	4.14	300
	August 1963	5.82	720		February 1965	4.57	390
					Apr. 10, 1965	3.08	120
1964	July 15, 1964	7.50	1,120		May 20-Aug. 11, 1965	4.31	340
	July 25, 1964	5.62	630				
	August or September 1964	----	2,200				

6. East Fork Sycamore Creek near Sunflower, Ariz.

Location. --Lat 33°57'15", long 111°27'35", in sec. 18, T. 7 N., R. 9 E. (unsurveyed), in Tonto National Forest, on left bank 2.1 miles upstream from West Fork and 6.3 miles north of Sunflower.

Drainage area. --4.24 sq mi.

Gage. --Water-stage recorder and concrete control. Altitude of gage is 4,140 ft (from topographic map). Prior to Nov. 10, 1964, at site 0.5 mile downstream at different datum.

Remarks. --Base discharge, 20 cfs. Stage-discharge relation defined by current-meter measurements below 18 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	Sept. 8, 1961	2.60	a12	1963	Sept. 1, 1963	2.84	30
1962	Jan. 25, 1962	2.56	11	1964	Nov. 21, 1963	2.12	.8
1963	Feb. 11, 1963	2.73	21	1965	Apr. 10, 1965	2.24	25
	Aug. 22, 1963	2.83	29				

a Maximum for period July to September.

7. West Fork Sycamore Creek near Sunflower, Ariz.
(Published as Alder Creek near Sunflower, 1961-64)

Location. --Lat 33°56'45", long 111°29'05", in SE¼ sec. 13, T. 7 N., R. 8 E (unsurveyed), in Tonto National Forest, 1.2 miles upstream from mouth and 5.7 miles north of Sunflower.

Drainage area. --9.80 sq mi (revised).

Gage. --Water-stage recorder and concrete control. Altitude of gage is 4,000 ft (from topographic map).

Remarks. --Base discharge, 40 cfs. Stage-discharge relation defined by current-meter measurements below 100 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	Sept. 13, 1961	1.36	a3.9	1964	Mar. 24, 1964	1.45	5.6
1962	Jan. 25, 1962	2.11	52	1965	Jan. 7, 1965	2.17	59
					Mar. 11, 1965	2.09	50
1963	Feb. 11, 1963	2.65	116		Apr. 10, 1965	2.43	90
	Aug. 22, 1963	3.29	115				
	Sept. 1, 1963	2.36	54				

a Maximum for period July to September.

8. Sycamore Creek near Sunflower, Ariz.

Location. --Lat 33°51'05", long 111°27'09", in NE¼ sec. 20, T. 6 N., R. 9 E., in Tonto National Forest, on right bank 1.1 miles upstream from Boulder Creek, 1.2 miles north of Crabtree Butte, and 1.2 miles southeast of Sunflower.

Drainage area. --53.4 sq mi.

Gage. --Water-stage recorder. Datum of gage is 3,307.9 ft.

Remarks. --Base discharge, 200 cfs. Stage-discharge relation defined by current-meter measurements below 190 cfs and by a slope-area measurement at 5.7 ft.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1962	Dec. 16, 1961	4.15	325	1963	Aug. 25, 1963	4.10	310
	Jan. 25, 1962	3.97	264		Aug. 30, 1963	4.10	310
	Mar. 20, 1962	3.83	237				
				1964	Aug. 12, 1964	4.02	286
1963	Feb. 11, 1963	5.7	1,120				
	Aug. 17, 1963	3.82	229	1965	Jan. 7, 1965	4.88	615
	Aug. 22, 1963	5.6	1,050		Feb. 7, 1965	4.72	540

Peak gage height, in feet, and discharge, in cubic feet per second, of Sycamore Creek near Sunflower, Ariz. —Continued

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1965	Mar. 12, 1965	3.94	240	1965	Apr. 10, 1965	5.13	762
	Apr. 4, 1965	4.71	550				

9. Camp Creek near Sunflower, Ariz.

Location. --Lat 33°45'35", long 111°29'44", in SW¼ sec. 24, T. 5 N., R. 8 E., on right bank at upstream side of culvert on State Highway 87, half a mile upstream from mouth and 7 miles south of Sunflower.

Drainage area. --2.6 sq mi, approximately.

Gage. --Water-stage recorder. Datum of gage is 2,186.61 ft above mean sea level (Arizona State Highway Dept. bench mark).

Remarks. --Base discharge, 20 cfs. Stage-discharge relation defined by current-meter measurements below 21 cfs and extended above on basis of computation of peak flow at 391 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	a Aug. 16, 1963	4.96	391	1965	Oct. 16, 1964	1.13	22
	Aug. 25, 1963	2.24	111		Jan. 7, 1965	1.49	51
					Feb. 7, 1965	1.29	35
1964	Aug. 2, 1964	3.40	216		Apr. 4, 1965	1.32	38
	Aug. 12, 1964	1.25	32				

a Probable date.

10. Rock Creek near Sunflower, Ariz.

Location. --Lat 33°43'49", long 111°30'28", in SE¼ sec. 35, T. 5 N., R. 8 E., on left bank 300 ft upstream from culvert on State Highway 87, 0.3 mile upstream from mouth, and 9.9 miles south of Sunflower.

Drainage area. --15 sq mi, approximately.

Gage. --Water-stage recorder and concrete control. Datum of gage is 2,051.59 ft above mean sea level (Arizona State Highway Dept. bench mark).

Remarks. --Base discharge, 90 cfs. Stage-discharge relation defined by current-meter measurements below 70 cfs and by slope-area measurements at 262 and 916 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 16, 1963	4.50	262	1964	Aug. 2, 1964	4.42	236
	a Aug. 22, 1963	4.26	191		Aug. 12, 1964	4.36	218
1964	Aug. 1, 1964	5.40	916	1965	Jan. 7, 1965	4.20	175

a Probable date.

11. Sycamore Creek near Fort McDowell, Ariz.
(Published as "near McDowell" 1960-63)

Location. --Lat 33°41'39", long 111°32'28", in sec. 16, T. 4 N., R. 8 E. (unsurveyed), in Tonto National Forest, on right bank 0.7 mile southwest of Sugarloaf Mountain, 8½ miles northeast of Fort McDowell, 10 miles upstream from mouth, and 25½ miles northeast of Scottsdale.

Drainage area. --165 sq mi.

Gage. --Water-stage recorder and concrete control. Datum of gage is 1,759.17 ft above mean sea level.

Remarks. --Base discharge, 400 cfs. Stage-discharge relation defined by current-meter measurements below 5,700 cfs and by a slope-area measurement at 15,800 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1960	Dec. 25-26,1959	15.0	a 15,800	1964	Aug. 1, 1964	3.54	1,060
					Aug. 2, 1964	2.45	405
1961	July 3, 1961	2.07	b 248		Aug. 12, 1964	2.70	540
1962	Dec. 16, 1961	2.94	674	1965	Jan. 7, 1965	3.70	1,170
	Jan. 25, 1962	2.60	622		Feb. 7, 1965	3.39	954
	Mar. 21, 1962	2.60	480		Mar. 12, 1965	2.50	440
					Apr. 4, 1965	3.52	1,040
1963	Feb. 11, 1963	5.05	2,300		Apr. 10, 1965	3.57	1,080
	Aug. 16, 1963	5.65	2,860		Apr. 12, 1965	2.60	490
	Aug. 22, 1963	3.30	869				

a Result of indirect measurement of annual peak prior to installation of gage.
b Maximum for period December 1960 to September 1961.

12. Indian Bend Wash near Scottsdale, Ariz.

Location. --Lat 33°32'20", long 111°54'50", in SE¼ sec. 2, T. 2 N., R. 4 E., on upstream side of ford on Indian Bend Road, 3½ miles north of Scottsdale.

Drainage area. --142 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,280.29 ft above mean sea level, datum of 1929.

Remarks. --Base discharge, 20 cfs. Stage-discharge relation defined by current-meter measurements below 630 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second, of Indian Bend Wash near Scottsdale, Ariz.

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	Sept. 9, 1961	0.88	315	1964	Oct. 19, 1963	1.39	328
	Sept. 13, 1961	1.25	745		July 15, 1964	1.15	203
					Aug. 13, 1964	1.11	184
1962	----	----	no flow		Aug. 27, 1964	1.22	237
1963	July 19, 1963	1.43	350	1965	Oct. 17, 1964	.63	24
	Aug. 5, 1963	.63	24		Jan. 6, 1965	.75	48
	Aug. 6, 1963	.74	46		Feb. 7, 1965	.84	76
	Aug. 17, 1963	1.38	170				
	Aug. 26, 1963	.78	57				

13. Indian Bend Wash (at McDonald Drive) near Scottsdale, Ariz.

Location. --Lat 33°32'00", long 111°54'30", in SE¼ sec. 11, T. 2 N., R. 4 E., on upstream side of McDonald Drive, 1.0 mile east of Scottsdale Road and 2½ miles northeast of Scottsdale.

Drainage area. --Not determined.

Gage. --Crest-stage gage installed Mar. 28, 1961. Datum of gage is 1,265.60 ft above mean sea level.

Remarks. --No flow high enough to record on gage during period of record. Station used to determine flood profiles.

14. Indian Bend Wash (at Indian School Road) at Scottsdale, Ariz.

Location. --Lat 33°29'42", long 111°54'31", in SE¼ sec. 23, T. 2 N., R. 4 E., at Indian School Road, 125 ft west of Hayden Road and 1 mile east of Scottsdale.

Drainage area. --Not determined.

Gage. --Crest-stage gage installed Mar. 29, 1961. Datum of gage is 1,233.43 ft above mean sea level.

Remarks. --No flow high enough to record on gage during period of record. Station used to determine flood profiles.

15. Indian Bend Wash (at McDowell Road) at Scottsdale, Ariz.

Location. --Lat 33°27'56", long 111°54'54", in SE¼ sec. 35, T. 2 N., R. 4 E., at culvert on McDowell Road, 0.6 mile east of Scottsdale Road and 2 miles south of Scottsdale.

Drainage area. --Not determined.

Gage. --Crest-stage gage installed Mar. 28, 1961. Altitude of gage is 1,200 ft (from topographic map).

Remarks. --No flow high enough to record on gage during period of record. Station used to determine flood profiles.

16. Salt River tributary No. 2 at Phoenix, Ariz.

Location. --Lat 33°27'36", long 111°58'26", in SW¼NW¼ sec. 5, T. 1 N., R. 4 E., on left bank at southwest corner of plant of Motorola, Inc., 3½ miles southwest of Scottsdale and 5.8 miles east of Phoenix Post Office.

Drainage area. --0.035 sq mi, approximately, of which about 80 percent is impervious surface.

Gage. --Water-stage recorder and 120° V-notch weir. Altitude of gage is 1,190 ft (from topographic map).

Remarks. --Base discharge, 15 cfs. Stage-discharge relation defined by current-meter measurements below 2 cfs and by weir computations at 2.48, 2.75, and 3.35 ft. Station discontinued July 31, 1965.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 25, 1963	2.34	24	1964	Sept. 13, 1964	2.26	22
					Sept. 14, 1964	3.35	66
1964	Oct. 19, 1963	2.48	29				
	July 14, 1964	2.10	18	1965	Feb. 7, 1965	1.88	13
	Aug. 2, 1964	2.17	20				

17. Salt River tributary in South Mountain Park, at Phoenix, Ariz.

Location. --Lat 33°20'50", long 112°05'00", in NE¼ sec. 18, T. 1 S., R. 3 E., at culvert in South Mountain Park, 7.7 miles south of Phoenix Post Office.

Drainage area. --1.75 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,405.20 ft above mean sea level, datum of 1929.

Remarks. --Base discharge, 20 cfs. Stage-discharge relation defined by current-meter measurements below 31 cfs and by indirect measurements of flow through culvert and flow over headwall at 161, 370, and 530 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	July 22, 1961	8.96	370	1964	July 14, 1964	2.92	28
					Aug. 1, 1964	4.95	120
1962	----	----	no flow		Aug. 2, 1964	8.83	332
					Sept. 13, 1964	3.05	32
1963	----	----	no flow				
				1965	June 23, 1965	3.10	34
1964	Oct. 19, 1963	9.52	530		Sept. 4, 1965	9.70	670

18. Cave Creek near Cave Creek, Ariz.

Location. --Lat 33°47'07", long 112°00'24", in SW¼ sec. 12, T. 5 N., R. 3 E., on left bank 200 ft upstream from Prescott-to-Mesa transmission line, 4¾ miles southwest of town of Cave Creek, and 5.0 miles upstream from Cave Creek Dam.

Drainage area. --121 sq mi.

Gage. --Water-stage recorder. Altitude of gage is 1,800 ft (from topographic map).

Remarks. --Base discharge, 500 cfs. Stage-discharge relation defined by current-meter measurements below 720 cfs and by slope-area measurements at 1,510 and 5,680 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1958	Sept. 12, 1958	6.79	a 5,680	1963	Aug. 6, 1963	4.32	1,510
	Sept. 23, 1958	3.05	760		Aug. 6, 1963	3.17	744
	Sept. 29, 1958	3.37	1,100		Aug. 26, 1963	2.86	580
1959	Aug. 5, 1959	5.42	3,590	1964	July 31, 1964	3.20	802
	Aug. 17, 1959	3.95	1,700		Aug. 1, 1964	5.52	2,900
					Aug. 2, 1964	5.67	3,120
1960	Oct. 1, 1959	3.74	1,470		Aug. 12, 1964	3.45	910
	Oct. 29, 1959	8.47	8,570		Aug. 13, 1964	3.43	898
	Dec. 25, 1959	6.11	5,800		Aug. 26, 1964	3.90	1,210
	Aug. 22, 1960	3.35	1,770				
				1965	Feb. 7, 1965	2.88	590
1961	Sept. 17, 1961	2.17	696		July 16, 1965	2.92	610
1962	Dec. 16, 1961	2.20	280				

a Maximum during period May to September.

19. Cave Creek at Phoenix, Ariz.

Location. --Lat 33°35'00", long 112°06'50", in SW¼ sec. 24, T. 3 N., R. 2 E., on right bank at Peoria Avenue in Phoenix, and 0.7 mile upstream from Arizona Canal.

Drainage area. --252 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,243.30 ft above mean sea level, datum of 1929, adjustment of 1948 (from Salt River Valley Water Users' Association temporary bench mark).

Remarks. --Base discharge, 500 cfs. Peak flow regulated by Cave Creek Dam 12 miles upstream. Stage-discharge relation defined by current-meter measurements.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1958	Sept. 13, 1958	2.76	573	1962	Dec. 16, 1961	1.87	81
1959	Aug. 5, 1959	2.93	541	1963	Aug. 6, 1963	2.05	103
1960	Dec. 14, 1959	2.84	557	1964	Aug. 27, 1964	2.51	356
	Dec. 25, 1959	2.80	525				
				1965	Feb. 7, 1965	2.20	171
1961	July 22, 1961	1.50	9				

20. Agua Fria River tributary No. 2 near Rock Springs, Ariz.

Location. --Lat 34°01'55", long 112°08'45", in SW¼ sec. 15, T. 8 N., R. 2 E., at culvert on State Highway 69, 1 mile south of Rock Springs and 9 miles north of New River.

Drainage area. --1.0 sq mi, approximately.

Gage. --Crest-stage gage installed July 29, 1963. Altitude of gage is 2,000 ft (from topographic map).

Remarks. --Base discharge, 40 cfs. Stage-discharge relation defined by current-meter measurements below 96 cfs and by culvert computations at 292, 411, and 1,200 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 16, 1963	6.28	411	1964	Aug. 2, 1964	a 19.54	1,200
	Aug. 22, 1963	5.06	292		Aug. 12, 1964	4.31	225
	Sept. 15, 1963	1.78	42		Aug. 26, 1964	1.86	45
1964	Mar. 24, 1964	2.75	96	1965	Jan. 6-8, 1965	2.60	87
	July 25, 1964	5.88	370		Feb. 7, 1965	1.76	41

a From high-water marks.

21. Agua Fria River (at Grand Avenue) at El Mirage, Ariz.

Location. --Lat 33°36'24", long 112°18'14", in NW¼NW¼ sec. 18, T. 3 N., R. 1 E., on downstream side of bridge on U. S. Highway 60, 70, three-quarters of a mile southeast of El Mirage and 16 miles upstream from mouth.

Drainage area. --1,573 sq mi, of which 114 sq mi is below Lake Pleasant.

Gage. --Crest-stage gage installed Dec. 5, 1962. Datum of gage is 1,113.00 ft above mean sea level.

Remarks. --Base discharge, 200 cfs. Stage-discharge relation defined by current-meter measurements below 700 cfs and extended above by logarithmic plotting. Discharge figures represent flow from area below Lake Pleasant.

Peak gage height, in feet, and discharge, in cubic feet per second, of Agua Fria River (at Grand Avenue) at El Mirage, Ariz.

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	September 1963	2.54	700	1964	Sept. 25-27, 1964	2.51	660
1964	July 30, 1964	3.73	2,500	1965	Oct. 16, 1964	2.30	500
	Aug. 1, 1964	1.97	300		Mar. 12, 1965	2.27	470

22. Agua Fria River tributary at Youngtown, Ariz.

Location. --Lat 33°34'47", long 112°18'02", on line between secs. 19 and 30, T. 3 N., R. 1 E., on Peoria Avenue at Oregon Street in Youngtown, 3.7 miles west of Peoria.

Drainage area. --0.13 sq mi.

Gage. --Water-stage recorder and Cipolletti weir. Altitude of gage is 1,130 ft (from topographic map).

Remarks. --Base discharge, 7 cfs. Stage-discharge relation computed from theoretical rating for Cipolletti weir.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	Aug. 14, 1961	0.70	a8.8	1964	July 15, 1964	0.84	13
					July 23, 1964	.88	14
1962	Jan. 24, 1962	.57	5.7		July 30, 1964	.99	17
					Aug. 1, 1964	.86	13
1963	Aug. 16, 1963	.75	10		Aug. 13, 1964	.71	9.0
	Aug. 22, 1963	.94	16				
	Aug. 26, 1963	.72	9.3	1965	Oct. 16, 1964	2.30	73
					Mar. 10, 1965	.66	7.8
1964	Oct. 19, 1963	.93	15		Apr. 9, 1965	.68	8.3

a Maximum for period March to September.

23. New River near Rock Springs, Ariz.

Location. --Lat 33°58'28", long 112°05'54", in SW¼SW¼ sec. 6, T. 7 N., R. 3 E., on right bank 4½ miles northeast of New River, 5 miles southeast of Rock Springs, and 37 miles upstream from mouth.

Drainage area. --67.3 sq mi.

Gage. --Flood-hydrograph recorder, Jan. 2, 1964, to September 1965. Crest-stage gage installed Feb. 2, 1965.

Remarks. --Base discharge, 200 cfs. Stage-discharge relation defined by current-meter measurements below 380 cfs and by slope-area measurements at 765, 4,900, and 1,550 cfs. Annual peaks only, prior to 1965.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1962	a Sept. 28, 1962	b3.1	1,050	1965	Feb. 6, 1965	----	----
					Mar. 13, 1965	1.57	295
1963	Aug. 16, 1963	b2.6	765		Apr. 4, 1965	3.73	1,510
					Apr. 9, 1965	2.59	735
1964	Aug. 2, 1964	b6.3	4,900		Aug. 14, 1965	1.85	360
					Sept. 4, 1965	1.43	220
1965	Jan. 7, 1965	3.0	980				

a Peak occurred prior to Aug. 16, 1963; the most probable date is September 28, 1962, but it may have been from peak of December 1959.
b Based on high-water profile past gage site.

24. New River near Black Canyon. Ariz.

Location. --Lat 33°54'20", long 112°08'40", in SW¼NE¼ sec. 34, T. 7 N., R. 2 E., on right bank a quarter of a mile downstream from bridge on State Highway 69, 11 miles south of Black Canyon City, and 30 miles upstream from mouth.

Drainage area. --85.7 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,973.16 ft above mean sea level, datum of 1929.

Remarks. --Base discharge, 300 cfs. Stage-discharge relation defined by current-meter measurements below 1,300 cfs and by slope-area measurements at 1,430 and 4,620 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	July 22-23, 1961	3.50	325	1964	Mar. 24, 1964	3.74	450
					Aug. 1, 1964	5.80	2,280
1962	Dec. 16, 1961	3.61	339		Aug. 2, 1964	7.18	4,380
	Sept. 28, 1962	5.57	1,430		Aug. 12, 1964	4.90	1,310
					Sept. 14, 1964	3.57	372
1963	Dec. 18, 1962	4.06	534				
	Feb. 11, 1963	3.48	319	1965	Oct. 17, 1964	4.15	672
	Aug. 5, 1963	3.60	360		Jan. 8, 1965	4.95	1,360
	Aug. 13, 1963	4.20	595		Jan. 20, 1965	3.77	445
	Aug. 15, 1963	3.52	332		Feb. 6, 1965	3.97	558
	Aug. 16, 1963	7.33	4,620		Apr. 1, 1965	3.40	304
	Aug. 25, 1963	4.67	832		Apr. 4, 1965	5.50	1,990
					Apr. 9, 1965	3.88	522
1964	Oct. 19, 1963	3.72	440		Sept. 2, 1965	3.40	300
	Nov. 21, 1963	5.65	2,170		Sept. 18, 1965	3.48	312

25. Deadman Wash (at Black Canyon Highway) near New River, Ariz.

Location.--Lat 33°50'30", long 112°08'40", in NW¼ sec. 27, T. 6 N., R. 2 E., at bridge on Black Canyon Highway, 4½ miles south of New River, and 7 miles upstream from mouth.

Drainage area.--10.7 sq mi.

Gage.--Crest-stage gage installed Apr. 26, 1961. Datum of gage is 1,722.82 ft above mean sea level.

Remarks.--Base discharge, 20 cfs. Stage-discharge relation defined by current-meter measurements below 65 cfs and by a slope-area measurement at 1,140 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
a 1960	December 1959	7.0	1,850	1964	Oct. 19, 1963	3.51	230
					Nov. 21, 1963	2.89	110
1961	----	----	(b)		July 30, 1964	5.92	1,140
					Aug. 1, 1964	4.49	520
1962	----	----	no flow		Aug. 12, 1964	2.66	75
					Aug. 26, 1964	2.43	50
1963	August 1963	2.25	35				
	August 1963	3.48	220	1965	Jan. 6-8, 1965	2.40	c 45
	August 1963	3.69	270		Apr. 4, 1965	2.59	c 70

a See p. 21.
b No peak above base during period April to September; probably none during water year.
c About.

26. New River (at Keefer Hill) near Phoenix, Ariz.

Location.--Lat 33°44'05", long 112°13'50", in NW¼ sec. 35, T. 5 N., R. 1 E., on right bank 8½ miles south of Lake Pleasant, 10½ miles northwest of Phoenix city limits, 11 miles north of Peoria, and 16 miles upstream from mouth.

Drainage area.--165 sq mi.

Gage.--Crest-stage gage installed May 24, 1961. Altitude of gage is 1,390 ft (from topographic map).

Remarks.--Operated for stage only. Peak of Aug. 16, 1963, determined by slope-area method as 1,840 cfs.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1961	----	(a)	1964	Aug. 2, 1964	5.00
				Aug. 12, 1964	1.63
1962	----	1.00			
			1965	Jan. 8, 1965	2.72
1963	Aug. 16, 1963	3.96		Feb. 7, 1965	3.22
1964	Mar. 25, 1964	.03			

a Flow did not reach gage from May to September; probably no flow during water year that would have reached gage.

27. New River (at Bell Road) near Peoria, Ariz.

Location.--Lat 33°38'18", long 112°14'22", in NE¼NE¼ sec. 3, T. 3 N., R. 1 E., on right bank 50 ft upstream from Bell Road, 1½ miles upstream from Skunk Creek, 3.1 miles north of Peoria, 5 miles northeast of El Mirage, and 9 miles upstream from mouth.

Drainage area.--185 sq mi.

Gage.--Flood-hydrograph recorder installed in October 1965. Datum of gage is 1,195.00 ft above mean sea level.

Remarks.--Base discharge, not determined. Stage-discharge relation defined by current-meter measurements Annual maximum discharges only.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 17, 1963	----	a 1,550	1965	Apr. 5, 1965	b 3.13	1,020
1964	no record	----	----				

a Result of indirect measurement.
b From high-water marks.

28. Skunk Creek (at Black Canyon Highway) near Phoenix, Ariz.

Location.--Lat 33°43'40", long 112°07'10", in SE¼ sec. 35, T. 5 N., R. 2 E., at bridge on Black Canyon Highway, 3 miles north of Adobe, 8½ miles north of Phoenix city limits, and 10 miles upstream from mouth.

Drainage area.--77.6 sq mi.

Gage.--Crest-stage gage installed May 23, 1961. Datum of gage is 1,465.60 ft above mean sea level.

Remarks.--Base discharge, 50 cfs. Stage-discharge relation defined by current-meter measurements below 6,200 cfs and extended above by logarithmic plotting.

Peak gage height, in feet, and discharge, in cubic feet per second, of Skunk Creek (at Black Canyon Highway) near Phoenix, Ariz.

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
a 1960	December 1959	4.0	9,000	1964	Oct. 19, 1963	0.82	180
					Nov. 21, 1963	2.19	1,600
1961	----	----	(b)		July 30, 1964	2.13	1,500
					Aug. 1, 1964	4.49	11,500
1962	Prior to May 8, 1962	.81	175		Aug. 2, 1964	2.25	1,750
					Aug. 12, 1964	2.91	3,500
					Aug. 26, 1964	1.44	560
1963	(c)	1.36	480				
	August 1963	.59	110	1965	Jan. 8, 1965	.18	(d)
	August 1963	.44	75		Feb. 7, 1965	1.27	(d)

a See p. 21.
b Flow did not reach gage during May to September; probably no flow during water year.
c Peak occurred between December 1962 and July 1963.
d Rating changed due to recent channel work; new rating not defined.

29. Skunk Creek (above Arizona Canal) near Peoria, Ariz.

Location. --Lat 33°38'02", long 112°13'16", in NE¼ sec. 2, T. 3 N., R. 1 E., on right bank 500 ft upstream from the Arizona Canal wasteway, 3.8 miles north of Peoria, and 1¾ miles upstream from mouth.

Drainage area. --105 sq mi.

Gage. --Crest-stage gage installed Dec. 5, 1962. Datum of gage is 1,195.44 ft above mean sea level.

Remarks. --Stage-discharge relation not defined. Peak flow of Aug. 1, 1964, determined as 6,940 cfs by slope-area method.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1963	----	(a)	1964	Aug. 1, 1964	b 10.02
1964	Oct. 19, 1963	2.7	1965	Feb. 8, 1965	2.19

a No flow during period December 1962 to September 1963; probably no flow during water year.
b From outside high-water marks.

30. New River (at Grand Avenue) at Peoria, Ariz.

Location. --Lat 33°35'43", long 112°15'45", in SE¼ sec. 16, T. 3 N., R. 1 E., at railroad bridge, 1¾ miles northwest of Peoria, 1¾ miles downstream from Skunk Creek, and 6 miles upstream from mouth.

Drainage area. --317 sq mi.

Gage. --Crest-stage gage installed May 25, 1961. Datum of gage is 1,126.70 ft above mean sea level.

Remarks. --Base discharge, 500 cfs. Stage-discharge relation prior to February 1965 defined by current-meter measurements below 5,200 cfs and extended above by logarithmic plotting. After February 1965, relation defined by current-meter measurements below 1,800 cfs and extended above by logarithmic plotting.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
a 1960	December 1959	3.9	6,400	1964	Nov. 21, 1963	2.4	850
					July 30, 1964	3.98	4,000
1961	July 22, 1961	.51	250		Aug. 1, 1964	4.73	8,300
					Aug. 2, 1963	3.18	4,200
1962	----	----	no flow				
				1965	Jan. 8, 1965	2.0	2,100
1963	Aug. 16-17, 1963	3.00	1,390		Feb. 7, 1965	.29	2,300
	Aug. 30, 1963	2.84	1,300		Apr. 4, 1965	.12	2,200

a See p. 21.

31. New River (at Olive Avenue) near Peoria, Ariz.

Location. --Lat 33°33'55", long 112°16'25", in SE¼ sec. 29, T. 3 N., R. 1 E., on upstream side of West Olive Avenue, 2 miles southwest of Peoria and 4 miles upstream from mouth.

Drainage area. --319 sq mi.

Gage. --Crest-stage gage installed Mar. 30, 1961. Datum of gage is 1,090.00 ft above mean sea level.

Remarks. --Records collected to determine flood profiles. Peak of December 25, 1959, was computed as 5,950 cfs by slope-area method.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1961	July 22, 1961	2.40	1964	Aug. 1, 1964	6.19
1962	----	no flow	1965	Jan. 8, 1965	2.87
				Feb. 7, 1965	2.80
1963	Aug. 16, 1963	2.23		Mar. 12, 1965	2.33
	Aug. 30, 1963	2.32		Apr. 4, 1965	3.09
1964	Nov. 21, 1963	1.97			

32. New River (at Glendale Avenue) near Glendale, Ariz.

Location. --Lat 33°32'11", long 112°16'52", in NW¼ sec. 8, T. 2 N., R. 1 E., on downstream side of bridge on Glendale Avenue, 2 miles upstream from mouth, 4 miles southwest of Peoria, and 5½ miles west of Glendale.

Drainage area. --323 sq mi.

Gage. --Water-stage recorder. Datum of gage is 1,049.91 ft above mean sea level. July 8 to Nov. 12, 1964, on upstream side of bridge at datum 2.92 ft higher. Feb. 13 to July 7, 1964, on downstream side of bridge at datum 3.06 ft higher. Apr. 26, 1961, to Feb. 13, 1964, crest-stage gage on downstream side of bridge at datum 5.12 ft higher.

Remarks. --Base discharge, 400 cfs. Stage-discharge relation defined by current-meter measurements below 6,300 cfs. Since April 1961, control has scoured about 5 ft and is subject to continual shifting at all stages, and discharges are approximate. Gage heights given are referenced to present gage datum.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
a 1960	December 1959	7.6	5,500	1964	Nov. 21, 1963	5.85	400
					July 30, 1964	6.97	2,700
1961	----	----	(b)		Aug. 1, 1964	6.72	7,000
					Aug. 2, 1964	4.20	3,000
1962	----	----	no flow				
				1965	Jan. 8, 1965	2.65	1,100
1963	Aug. 16-17, 1963	6.6	550		Feb. 7, 1965	2.32	620
	Aug. 30, 1963	6.84	690		Apr. 4, 1965	2.50	940

a See p. 21; discharge estimated from that at other stations.
b No flow during period April to September; probably no flow during water year.

33. Agua Fria River (at Indian School Road) near Litchfield Park, Ariz.

Location. --Lat 33°32'34", long 112°18'43", in SE¼ sec. 24, T. 2 N., R. 1 W., on upstream side of Indian School Road, 1½ miles downstream from New River, 2.7 miles east of Litchfield Park, and 7½ miles upstream from mouth.

Drainage area. --1,940 sq mi, of which 481 sq mi is below Lake Pleasant.

Gage. --Crest-stage gage installed Mar. 29, 1961. Datum of gage is 1,012.40 ft above mean sea level.

Remarks. --Records collected to determine flood profiles. Floods originate in area below Lake Pleasant.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1961	----	(a)	1964	July 30, 1964	1.27
				Aug. 1, 1964	1.67
1962	----	no flow		Aug. 2, 1964	.99
1963	Aug. 16, 1963	0.61	1965	Jan. 8, 1965	1.14
				Mar. 10, 1965	1.02
1964	Nov. 21, 1963	.75		Mar. 19-26, 1965	.83

a No flow March to September; probably no flow during water year.

34. Agua Fria River (at McDowell Road) near Avondale, Ariz.

Location. --Lat 33°27'50", long 112°19'21", in NW¼NW¼ sec. 1, T. 1 N., R. 1 W., on downstream side of McDowell Road, 2½ miles northeast of Avondale and 5½ miles upstream from mouth.

Drainage area. --1,943 sq mi, of which 484 sq mi is below Lake Pleasant.

Gage. --Crest-stage gage installed Mar. 29, 1961. Datum of gage is 980.00 ft above mean sea level.

Remarks. --Base discharge, 100 cfs. Stage-discharge relation defined by current-meter measurements below 950 cfs and extended above on basis of a slope-area measurement at 3.9 ft. Discharge figures represent flow from area below Lake Pleasant.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	----	----	(a)	1964	Nov. 21, 1963	1.08	150
					July 30, 1964	2.61	1,500
1962	----	----	no flow		Aug. 1, 1964	3.9	4,290
1963	Aug. 16-17, 1963	0.63	80	1965	Feb. 8, 1965	b 1.4	b 300

a No flow during period March to September; probably no flow during water year.
b Estimated.

35. Agua Fria River (at Buckeye Road) at Avondale, Ariz.

Location. --Lat 33°26'06", long 112°19'29", in NW¼ sec. 14, T. 1 N., R. 1 W., on downstream side of highway bridge on Buckeye Road, half a mile east of Avondale, and 3 miles upstream from mouth.

Drainage area. --1,945 sq mi, of which 486 sq mi is below Lake Pleasant.

Gage. --Crest-stage gage installed Apr. 26, 1961. Datum of gage is 950.00 ft above mean sea level.

Remarks. --Base discharge, no flow. Stage-discharge relation defined by current-meter measurements below 500 cfs and extended above by logarithmic plotting. Discharge figures represent flow from area below Lake Pleasant.

Peak gage height, in feet, and discharge, in cubic feet per second, of Agua Fria River (at Buckeye Road) at Avondale, Ariz.

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
a 1960	December 1959	11.0	4,700	1964	July 30, 1964	9.03	940
					Aug. 1, 1964	10.17	3,000
1961	----	----	(b)		Aug. 3, 1964	8.45	420
1962	----	----	no flow	1965	Jan. 8, 1965	8.34	350
					Feb. 7-8, 1965	8.05	190
1963	August 1963	7.67	63		Apr. 4-5, 1965	8.52	460
1964	Nov. 21, 1963	8.01	170				

a See p. 21.
b No flow during the period April to September 1961; probably no flow during water year.

36. Waterman Wash near Buckeye, Ariz.

Location. --Lat 33°19'49", long 112°30'33", in W½NE¼ sec. 24, T. 1 S., R. 3 W., on right bank 2.4 miles upstream from mouth and 5.2 miles southeast of Buckeye Post Office.

Drainage area. --403 sq mi.

Gage. --Crest-stage gage installed Sept. 29, 1964. Altitude of gage is 880 ft (from topographic map).

Remarks. --Base discharge, 500 cfs. Stage-discharge relation defined by field estimate below 600 cfs and by slope-area measurements at 2,680 and 5,560 cfs. Discharges are approximate.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1964	Sept. 13, 1964	a 4.6	2,680	1965	July 30-Sept. 2, 1965	3.85	1,200

a From high-water marks.

37. Hassayampa River at Box damsite, near Wickenburg, Ariz.

Location. --Lat 34°02'35", long 112°42'35", in SE¼ sec. 7, T. 8 N., R. 4 W. (unsurveyed), at Box damsite, 7½ miles upstream from Wickenburg.

Drainage area. --417 sq mi.

Gage. --Water-stage recorder. Datum of gage is 2,236.12 ft above mean sea level, datum of 1929. At site 1 mile downstream at datum 23.76 ft lower, January to June 1938. At present site at datum 2.16 ft higher May 1, 1946, to Nov. 17, 1949. All gage heights referenced to present site and datum.

Historical data. --Records obtained by W. A. Farish, engineer for Joseph Wittman, show high-magnitude floods on Sept. 19, 1925 (25,500 cfs), Feb. 16, 1927 (27,100 cfs), and Feb. 7, 1937 (22,000 cfs). Basis for these discharge figures is not known, and they are not included in the listing below. Additional data furnished by Farish are in files of the Geological Survey.

Remarks. --Base discharge, 500 cfs. Peak discharges unaffected by small diversions for mining and irrigation. Stage-discharge relation defined by current-meter measurements below 2,000 cfs and extended above on basis of slope-area measurements at 5,600 and 27,000 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1938	Mar. 3, 1938	10.65	a 10,000	1955	June 13, 1955	6.17	1,340
					July 21, 1955	6.90	2,380
1946	July 22, 1946	5.88	664		July 23, 1955	9.81	8,840
	Aug. 11, 1946	7.0	1,710		July 24, 1955	5.04	643
	Aug. 14, 1946	6.41	1,110		July 31, 1955	6.58	2,310
					Aug. 2, 1955	4.85	518
1947	Aug. 8, 1947	7.41	2,300		Aug. 10, 1955	7.22	3,350
					Aug. 14, 1955	5.60	1,070
1948	Aug. 5, 1948	9.16	5,600		Aug. 21, 1955	8.84	6,710
					Aug. 23, 1955	9.80	8,820
1949	Jan. 13, 1949	5.26	651		Aug. 25, 1955	4.50	615
	Jan. 25, 1949	5.36	708				
	July 4, 1949	7.40	2,510	1956	Oct. 4, 1955	5.14	792
	Sept. 11, 1949	6.21	1,310		July 25, 1956	5.10	685
	Sept. 14, 1949	5.76	970		Aug. 18, 1956	5.70	1,210
	Sept. 26, 1949	7.71	2,910				
				1957	Jan. 27, 1957	5.95	1,300
1950	Oct. 18, 1949	9.01	5,500		Aug. 10, 1957	6.34	1,980
					Aug. 12, 1957	5.77	947
1951	Aug. 3, 1951	6.05	2,130				
	Aug. 20, 1951	4.80	750	1958	Oct. 21, 1957	5.60	556
	Aug. 26, 1951	7.7	4,910		Nov. 1, 1957	6.25	1,320
	Aug. 29, 1951	18.3	27,000		Nov. 3, 1957	5.90	935
					Feb. 4, 1958	6.60	1,580
1952	Oct. 30, 1951	3.70	885		Aug. 14, 1958	7.95	1,420
	Dec. 30, 1951	4.50	1,590		Aug. 15, 1958	7.10	800
	Jan. 18, 1952	3.50	590		Aug. 20, 1958	7.21	768
	Mar. 11, 1952	5.35	1,410		Aug. 28, 1958	7.58	1,560
	Mar. 17, 1952	4.90	910		Sept. 5, 1958	11.8	10,600
	Aug. 14, 1952	6.05	775		Sept. 12, 1958	7.68	3,450
	Sept. 20, 1952	5.70	580				
				1959	Aug. 2, 1959	6.27	1,240
1953	July 18, 1953	5.95	865		Aug. 11, 1959	7.41	2,030
					Aug. 21, 1959	6.28	1,100
1954	Mar. 23, 1954	6.64	3,090		Aug. 24, 1959	9.12	5,110
	Mar. 25, 1954	5.04	1,120				
	Sept. 2, 1954	7.63	2,760	1960	Dec. 26, 1959	7.49	3,210

a Annual peak only; maximum flow for period 1938-45.

Peak gage height, in feet, and discharge, in cubic feet per second, of Hassayampa River at Box damsite, near Wickenburg, Ariz. —Continued

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1960	Aug. 10, 1960	6.15	1,120	1963	Aug. 20, 1963	7.42	1,270
	Aug. 23, 1960	7.15	2,780		Aug. 26, 1963	7.28	1,130
	Sept. 2, 1960	5.94	926				
				1964	July 14, 1964	8.10	1,230
1961	Aug. 15, 1961	6.24	528		July 30, 1964	7.15	760
	Aug. 19, 1961	6.88	1,150		Aug. 2, 1964	7.07	696
	Aug. 30, 1961	6.85	845		Sept. 14, 1964	6.65	535
	Sept. 17, 1961	6.52	514				
				1965	Apr. 4, 1965	8.80	1,370
1962	Sept. 21, 1962	7.94	1,510		Apr. 10, 1965	9.40	2,850
					Sept. 2, 1965	12.90	9,060
1963	Aug. 17, 1963	8.24	2,150		Sept. 4, 1965	10.50	5,240

38. Hartman Wash near Wickenburg, Ariz.

Location. --Lat 33°57'46", long 112°49'40", in SE¼ sec. 12, T. 7 N., R. 6 W., at culvert on U. S. Highway 60 and 70, 3.3 miles west of junction of Vulture Mine Road and U. S. Highway 60 and 70 and 5½ miles west of Wickenburg.

Drainage area. --5.57 sq mi.

Gage. --Crest-stage gage installed in November 1963. Datum of gage is 2,490.00 ft above mean sea level.

Remarks. --Base discharge, 50 cfs. Stage-discharge relation defined by float measurement below 55 cfs and by theoretical rating for culvert above 900 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1964	Nov. 7, 1963	a3.50	250	1965	Sept. 3-5, 1965	2.94	50
	Aug. 23, 1964	6.88	1,840				

a From high-water profile.

39. Hassayampa River at Wickenburg, Ariz.

Location. --Lat 33°58'17", long 112°43'33", in SW¼SE¼ sec. 1, T. 7 N., R. 5 W., on left bank 300 ft upstream from bridge on U. S. Highway 60, 70, and 89 at Wickenburg.

Drainage area. --685 sq mi.

Gage. --Crest-stage gage installed Dec. 12, 1962. Datum of gage is 2,030.00 ft above mean sea level.

Remarks. --Records collected to determine flood profiles.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1963	Aug. 3, 1963	8.86	1964	August 1964	7.78
	August or September, 1963	7.70		Sept. 25-27, 1964	7.71
			1965	July 10-11, 1965	5.95
1964	July 14, 1964	7.74		Sept. 2, 1965	10.15
	July 30-Aug. 2, 1964	7.12		Sept. 4, 1965	8.73

40. Hassayampa River near Morristown, Ariz.

Location. --Lat 33°53'06", long 112°39'41", in SW¼SE¼ sec. 3, T. 6 N., R. 4 W., 600 ft downstream from San Domingo Wash, 3.0 miles northwest of Morristown, and 7 miles southeast of Wickenburg.

Drainage area. --774 sq mi.

Gage. --Crest-stage gage installed in November 1963. Datum of gage is 1,831.16 ft above mean sea level. Water-stage recorder, October 1938 to June 1947.

Remarks. --Base discharge, 1,100 cfs. Stage-discharge relation defined by current-meter measurements below 1,600 cfs and by a slope-area measurement at 6,100 cfs for period 1938-47; for period 1963-65 relation defined by field estimates below 150 cfs and by a slope-area measurement at 9,280 cfs. Peak discharges unaffected by small diversions for mining and irrigation. Annual peaks only after 1947.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1939	Dec. 20, 1938	7.30	2,700	1941	Aug. 9, 1941	7.73	3,460
	Sept. 4, 1939	6.6	1,240		Aug. 29, 1941	7.27	2,050
	Sept. 6, 1939	8.7	6,200				
	Sept. 12, 1939	6.55	1,600	1942	Aug. 5, 1942	5.7	100
1940	Feb. 1, 1940	5.9	160	1943	Aug. 3, 1943	9.9	7,700
					Aug. 14, 1943	8.52	3,800
1941	Oct. 5, 1940	7.18	2,460		Sept. 26, 1943	6.80	1,200
	Dec. 24, 1940	7.30	3,350				
	Feb. 25, 1941	6.96	2,600	1944	Oct. 18, 1943	7.68	2,420
	Mar. 2, 1941	8.36	6,100		Feb. 24, 1944	7.22	1,510
	Mar. 5, 1941	6.66	2,040		Aug. 9, 1944	8.10	3,520
	Mar. 14, 1941	7.90	4,060				
	Apr. 11, 1941	7.57	3,020	1945	Aug. 2, 1945	7.55	2,200
	Apr. 15, 1941	7.05	1,320		Aug. 10, 1945	6.98	1,110
	July 24, 1941	7.50	2,110				

Peak gage height, in feet, and discharge, in cubic feet per second, of Hassayampa River near Morristown, Ariz. —Continued

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1946	July 22, 1946	7.38	1,510	1956	(a)	b 10.15	(a)
	Aug. 11, 1946	7.50	2,090				
	Sept. 17, 1946	7.60	2,310	1964	July 12-14, 1964	b 10.1	c 4,000
1947	Aug. 8, 1947	8.95	6,000	1965	Sept. 2, 1965	b 11.6	9,280
1954	(a)	b 10.50	(a)				

a Not determined.
b From high-water marks.
c About.

41. Ox Wash near Morristown, Ariz.

Location. --Lat 33°53'00", long 112°39'00", in NW¼ sec. 11, T. 6 N., R. 4 W., at culvert on U. S. Highway 60 and 70, 2½ miles northwest of Morristown and 7½ miles southeast of Wickenburg.

Drainage area. --7.44 sq mi.

Gage. --Crest-stage gage installed Oct. 25, 1965. Altitude of gage is 1,990 ft (from topographic map). No gage during period of highway construction, May 1964 to October 1965. Crest-stage gage and flood-hydrograph recorder at old highway, July 18, 1963, to May 1964.

Remarks. --Annual peaks only.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 22, 1963	7.2	720	1965	No record	----	----
1964	Aug. 26, 1964	a 10.2	2,900				

a From high-water mark.

42. Jack Rabbit Wash near Tonopah, Ariz.

Location. --Lat 33°39'32", long 112°49'40", in NE¼SE¼ sec. 25, T. 4 N., R. 6 W., on left bank 100 ft upstream from the Wickenburg-Hassayampa Road crossing and 13¼ miles northeast of Tonopah.

Drainage area. --137 sq mi.

Gage. --Crest-stage gage installed Nov. 5, 1963. Datum of gage is 1,510.00 ft above mean sea level.

Remarks. --Base discharge, 300 cfs. Stage-discharge relation defined by slope-area measurements at 1,240 and 2,070 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1964	July 31, 1964	8.53	1,240	1965	Apr. 4, 1965	8.05	750
	Aug. 26, 1964	9.19	2,070		August or September, 1965	7.7	450
1965	Feb. 6-7, 1965	8.04	740				

43. Hassayampa River near Arlington, Ariz.

Location. --Lat 33°20'50", long 112°43'30", in NW¼ sec. 13, T. 1 S., R. 5 W., on downstream side of bridge on former U. S. Highway 80, 0.2 mile east of Hassayampa store, 1.8 miles upstream from mouth, and 2.8 miles northeast of Arlington.

Drainage area. --1,470 sq mi.

Gage. --Water-stage recorder. Datum of gage is 931.91 ft above mean sea level.

Remarks. --Base discharge, 1,000 cfs. Stage-discharge relation defined by current-meter measurements below 1,800 cfs and by slope-area measurements at 1,930 and 2,960 cfs. Relation subject to considerable shifting at all stages, and discharges are approximate.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	----	----	(a)	1964	Aug. 14, 1964	6.05	6,500
					Aug. 26, 1964	5.50	5,000
1962	Sept. 6, 1962	4.35	470				
				1965	Feb. 7, 1965	4.70	3,000
1963	Aug. 23-26, 1963	5.76	1,930		Aug. 14, 1965	4.10	1,900
					Sept. 3, 1965	4.60	2,960
1964	July 15, 1964	4.65	3,000		Sept. 4, 1965	4.25	2,200
	July 30, 1964	4.45	1,600		Sept. 5, 1965	4.20	2,100
	Aug. 2, 1964	5.70	4,500				

a No flow during period February to September, except for irrigation return flow; probably no peaks during water year.

44. Prison Wash near Wickenburg, Ariz.

Location. --Lat 33°57'00", long 113°00'00", in SW¼ sec. 16, T. 5 N., R. 7 W., at culvert on U. S. Highway 60 and 70, 4.7 miles southeast of Forepaugh and 16 miles west of Wickenburg.

Drainage area. --0.39 sq mi, including an undetermined area above stock pond.

Gage. --Crest-stage gage installed July 18, 1963. Datum of gage is 2,429.00 ft above mean sea level.

Remarks. --Stage-discharge relation not defined. Peak of July 14, 1964, was 222 cfs from culvert computation. Station discontinued Sept. 30, 1965.

Peak gage height, in feet, of Prison Wash near Wickenburg, Ariz.

Water year	Date	Gage height	Water year	Date	Gage height
1963	September 1963	2.94	1964	Aug. 25, 1964	3.55
1964	October 1963	1.50	1965	Jan. 6-8, 1965	1.20
	Nov. 7, 1963	1.80		Feb. 6-7, 1965	1.42
	July 14, 1964	3.67		Apr. 5, 1965	1.42
	July 30, 1964	3.57			

45. Centennial Wash tributary near Salome, Ariz.

Location. --Lat 33°50'40", long 113°27'59", in SW¼SW¼ sec. 24, T. 6 N., R. 12 W., at culvert on U. S. Highway 60 and 70, 4.8 miles east of Wenden and 10 miles east of Salome.

Drainage area. --2.79 sq mi.

Gage. --Crest-stage gage installed July 18, 1963. Datum of gage is 1,976.00 ft above mean sea level.

Remarks. --Base discharge, 30 cfs. Stage-discharge relation defined by field estimates below 30 cfs and a culvert computation at 394 cfs. Discharges are approximate.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 16, 1963	3.78	394	1965	Feb. 7, 1965	1.71	25
	Sept. 17, 1963	2.22	65				
1964	Aug. 2, 1964	1.83	30				

46. Tiger Wash near Aguila, Ariz.

Location. --Lat 33°44'30", long 113°16'43", in SW¼SW¼ sec. 26, T. 5 N., R. 10 W., about 0.2 mile southeast of Eagle Eye Road, 17 miles south of Aguila, and 10 miles north of Eagle Eye Road junction with Buckeye-Salome Road.

Drainage area. --84 sq mi, approximately.

Gage. --Crest-stage gage installed Sept. 20, 1965. Altitude of gage is 1,870 ft (from topographic map).

Remarks. --Annual peaks only. Discharges are from slope-area measurements of peak flows.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 16, 1963	----	a 910	1965	Aug. 18, 1965	c 7.5	1,680
1964	----	----	(b)				

a At site half a mile upstream from gage.
b Discharge known to be less than that for 1963 water year.
c From high-water marks.

47. Tiger Wash, west channel, near Salome, Ariz.

Location. --Lat 33°37'22", long 113°19'47", in NE¼NW¼ sec. 7, T. 3 N., R. 10 W., on Buckeye-Salome Road, 0.4 mile southeast of Yuma and Maricopa County line and 21 miles southeast of Salome.

Drainage area. --98.1 sq mi.

Gage. --Crest-stage gage July 25, 1963, to Sept. 20, 1965. Altitude of gage is 1,475 ft (from topographic map).

Remarks. --Stage-discharge relation not defined. Station discontinued Sept. 30, 1965.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1963	Aug. 14, 1963	4.26	1965	Jan. 6-8, 1965	2.30
	Aug. 16, 1963	3.46		Feb. 6, 1965	3.15
				Apr. 4, 1965	2.16
1964	Oct. 19, 1963	2.27		Apr. 4-15, 1965	1.90
	Aug. 2, 1964	2.81		Aug. 18, 1965	4.38
	September 1964	3.05			

48. Winters Wash near Tonopah, Ariz.

Location. --Lat 33°29'22", long 112°55'05", in SW¼NW¼ sec. 30, T. 2 N., R. 6 W., on right bank 0.3 mile downstream from Airline Road and 1 mile east of Tonopah.

Drainage area. --47.8 sq mi.

Gage. --Crest-stage gage installed in July 1963. Altitude of gage is 1,080 ft (from topographic map). Flood-hydrograph recorder, Nov. 6, 1963, to Sept. 30, 1965.

Remarks. --Stage-discharge relation not defined.

Peak gage height, in feet, and discharge, in cubic feet per second, of Winters Wash near Tonopah, Ariz.

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1962	Sept. 5, 1962	a 6.16	b 776	1964	August 1964	4.56	----
1963	September 1963	----	c 100	1965	Feb. 7, 1965	5.91	----
					Mar. 10-11, 1965	3.92	----
1964	Aug. 1, 1964	5.67	----		Apr. 4, 1965	----	----
	August 1964	6.00	----		May 12, 1965	4.00	----
	August 1964	5.89	----		Aug. 14, 1965	5.20	----

a From high-water marks.
b Result of indirect measurement of annual peak flow prior to installation of gage.
c Estimated.

49. Centennial Wash near Arlington, Ariz.

Location. --Lat 33°16'05", long 112°47'50", on line between secs. 7 and 8, T. 2 S., R. 5 W., on upstream side of ford on former U. S. Highway 80, 3.0 miles upstream from Gillespie Dam and 4.4 miles southwest of Arlington.

Drainage area. --1,810 sq mi.

Gage. --Water-stage recorder. Datum of gage is 773.22 ft above mean sea level, datum of 1929.

Remarks. --Base discharge, 1,000 cfs. Stage-discharge relation defined by current-meter measurements below 5,500 cfs and extended above by logarithmic plotting.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1961	July 23, 1961	4.70	14,500	1964	July 31, 1964	3.74	2,850
	July 29, 1961	3.71	3,870				
				1965	Feb. 7, 1965	3.27	1,030
1962	Sept. 6, 1962	3.09	1,110				
1963	----	----	no flow				

50. Gila River below Gillespie Dam, Ariz.
(Published as "at Gillespie Dam" prior to 1939)

Location. --Lat 33°13'45", long 112°46'00", in SE¼NE¼ sec. 28, T. 2 S., R. 5 W., at Gillespie Dam, 8 miles downstream from Hassayampa River. Gila Bend Canal diverts from left bank and Enterprise Canal diverts from right bank at Gillespie Dam.

Drainage area. --49,650 sq mi.

Gage. --Nonrecording prior to July 28, 1924; recording thereafter. Datum of gage is 753.46 ft above mean sea level, datum of 1929, which is 10.00 ft below average elevation of crest of dam. At different datum prior to Nov. 11, 1924; at datum 10.00 ft higher Nov. 11, 1924, to July 22, 1932; at datum 5.00 ft higher July 23, 1932, to Apr. 27, 1955, and at present datum thereafter.

Historical data. --Greatest known flood occurred in February 1891 (estimated discharge, 250,000 cfs).

Remarks. --Base discharge, 2,000 cfs, 1925-38; 1,000 cfs, 1939-65. Flood record shown is that for uncontrolled areas below major dams. Records include flow over crest and through sluice gates of Gillespie Dam, but do not include flow in Gila Bend and Enterprise Canals, which divert from river immediately above dam. Other large diversions above station for irrigation, municipal, and industrial use. Flow of Gila River and tributaries above this station is regulated by San Carlos Reservoir on Gila River (capacity, 1,206,000 acre-ft), by a series of reservoirs on Salt River (capacity, 1,755,000 acre-ft), by Bartlett and Horseshoe Reservoirs on Verde River (capacity, 317,700 acre-ft), and by Lake Pleasant on Agua Fria River (capacity, 157,600 acre-ft). Stage-discharge relation defined by current-meter measurements below 56,000 cfs and extended above on basis of computation of peak flow over dam. Relation affected by operation of sluice and diversion gates at dam. Only annual peaks are shown prior to 1925.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1891	February 1891	----	a 250,000	1928	Aug. 3, 1928	1.26	5,600
					Aug. 29, 1928	.70	2,350
1921	Aug. 22, 1921	3.25	26,800				
				1929	Apr. 6, 1929	2.74	20,700
1922	Jan. 4, 1922	3.67	32,700		Aug. 18, 1929	.60	2,050
					Sept. 5, 1929	.88	3,680
1923	Sept. 20, 1923	2.00	13,100		Sept. 26, 1929	1.15	5,210
1924	Dec. 28, 1923	6.00	85,000	1930	Mar. 19, 1930	.82	3,160
					Aug. 10, 1930	2.19	13,900
1925	Sept. 2, 1925	.68	2,500				
	Sept. 6, 1925	1.73	9,570	1931	Feb. 16, 1931	2.50	17,500
	Sept. 20, 1925	2.23	15,200		Aug. 6, 1931	1.20	5,470
					Aug. 12, 1931	1.45	7,530
1926	Oct. 6, 1925	1.28	6,160		Aug. 31, 1931	1.41	6,930
	Dec. 4, 1925	.72	2,700				
	Mar. 31, 1926	.88	4,060	1932	Oct. 3, 1931	.73	2,360
	Apr. 8, 1926	3.15	26,700		Dec. 11, 1931	1.00	3,690
	Apr. 21, 1926	1.02	4,760		Feb. 11, 1932	4.47	44,500
	July 27, 1926	.87	3,520		Feb. 20, 1932	1.78	9,670
	Sept. 9, 1926	1.05	4,620		Mar. 3, 1932	1.65	8,260
	Sept. 30, 1926	3.95	38,300		Mar. 12, 1932	.67	2,090
					Mar. 22, 1932	.92	3,270
1927	Dec. 8, 1926	1.84	10,600				
	Dec. 15, 1926	.68	2,500	1933	Oct. 9, 1932	5.70	2,180
	Feb. 18, 1927	5.45	67,300				
	Mar. 12, 1927	1.04	4,560	1934	Aug. 30, 1934	5.88	3,100
	Mar. 17, 1927	.81	3,160				
	Sept. 13, 1927	3.71	34,900	1935	Feb. 10, 1935	6.60	7,470
					Feb. 17, 1935	5.73	2,240
1928	Feb. 6, 1928	1.70	9,220		Mar. 17, 1935	6.06	3,890

a Estimated

Peak gage height, in feet, and discharge, in cubic feet per second, of Gila River below Gillespie Dam, Ariz. —Continued

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1935	Aug. 25, 1935	5.84	2,380	1948	Aug. 9, 1948	5.23	330
	Sept. 1, 1935	5.71	2,140				
				1949	Aug. 7, 1949	5.42	976
1936	July 29, 1936	5.90	3,240				
				1950	Oct. 19, 1949	5.56	1,460
1937	Feb. 9, 1937	8.48	45,800				
	Feb. 17, 1937	7.67	18,400	1951	July 28, 1951	----	2,340
	Mar. 16, 1937	6.00	4,520		Aug. 4, 1951	5.96	2,880
	Mar. 19, 1937	7.77	21,300		Aug. 28, 1951	7.55	16,600
1938	Mar. 5, 1938	9.95	60,000	1952	Jan. 22, 1952	5.23	430
1939	Aug. 10, 1939	5.70	2,200	1953	Nov. 20, 1952	5.10	115
	Sept. 5, 1939	2.43	2,500				
	Sept. 13, 1939	5.97	3,240	1954	Aug. 12, 1954	5.64	1,760
1940	Aug. 19, 1940	5.87	2,620	1955	July 25, 1955	10.56	1,870
					Aug. 8, 1955	10.78	2,240
1941	Jan. 4, 1941	6.16	5,850		Aug. 14, 1955	11.05	3,420
	Feb. 10, 1941	5.68	1,910		Aug. 28, 1955	10.82	3,660
	Feb. 16, 1941	5.44	1,040				
	Feb. 19, 1941	5.65	1,800	1956	----	----	no flow
	Feb. 24, 1941	6.57	7,180				
	Feb. 28, 1941	6.70	7,250	1957	Jan. 29, 1957	10.14	205
	Mar. 5, 1941	7.07	10,800				
	Mar. 16, 1941	9.45	45,800	1958	Sept. 13, 1958	10.48	976
	Apr. 5, 1941	5.95	3,060				
	Apr. 18, 1941	8.08	25,300	1959	Aug. 17, 1959	10.22	480
	May 5, 1941	7.05	10,600				
	Aug. 12, 1941	5.43	1,010	1960	Jan. 19, 1960	10.31	640
1942	Dec. 13, 1941	5.30	580	1961	July 23, 1961	10.21	380
1943	Aug. 5, 1943	5.75	2,200	1962	----	----	no flow
1944	Feb. 25, 1944	5.29	580	1963	Oct. 4, 1962	10.09	100
1945	Aug. 14, 1945	5.53	1,350	1964	Aug. 14, 1964	10.15	230
1946	Sept. 19, 1946	5.85	4,290	1965	Sept. 4, 1965	10.07	230
	Sept. 24, 1946	5.92	2,880				
1947	Aug. 9, 1947	5.63	4,390				

51. Rainbow Wash tributary near Buckeye, Ariz.

Location. --Lat 33°14'35", long 112°38'15", in NE¼ sec. 23, T. 2 S., R. 4 W., at culvert on U. S. Highway 80, 4.4 miles north of the roadside rest area, 11.4 miles south of Buckeye, and at highway mile 141.6.

Drainage area. --3.45 sq mi.

Gage. --Crest-stage gage installed Nov. 5, 1963. Datum of gage is 900.00 ft above mean sea level.

Remarks. --Base discharge, 25 cfs. Stage-discharge relation is defined by a theoretical rating for culvert.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 1-6, 1963	2.82	112	1965	Feb. 7, 1965	2.90	120
					Apr. 3-9, 1965	2.39	60
1964	July 14, 1964	4.27	440		August 1965	2.58	90
	Aug. 1, 1964	2.93	138				
	Sept. 13, 1964	5.86	763				

52. Rainbow Wash near Gila Bend, Ariz.

Location. --Lat 33°11'10", long 112°42'10", in NE¼ sec. 7, T. 3 S., R. 4 W., on left bank attached to concrete structure of Gila Bend Canal siphon, 100 ft upstream from bridge on former U. S. Highway 80, 5.0 miles southeast of Gillespie Dam, and 16.5 miles north of Gila Bend.

Drainage area. --45 sq mi, approximately.

Gage. --Water-stage recorder and trapezoidal flume.

Remarks. --Stage-discharge relation not defined.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1961	July 3, 1961	a6.10	1964	Aug. 2, 1964	5.60
				Aug. 12, 1964	3.90
1962	----	no flow		Sept. 13, 1964	7.13
				Sept. 14, 1964	5.55
1963	Aug. 1, 1963	5.67			
	Aug. 6, 1963	5.57	1965	Feb. 7, 1965	b2.70
1964	July 31, 1964	3.40			

a From outside high-water marks.
b Discharge estimated as 10 cfs.

53. Bender Wash tributary near Gila Bend, Ariz.

Location. --Lat 32°51'35", long 112°23'40", in SE¼ sec. 31, T. 6 S., R. 1 W., at culvert on State Highway 84 and Interstate 10, 0.1 mile west of Big Horn and 19½ miles southeast of Gila Bend.

Drainage area. --4.3 sq mi.

Gage. --Three crest-stage gages installed Nov. 26, 1963. Datum of reference gage is 1,709.00 ft above mean sea level.

Remarks. --Stage-discharge relation not defined. Station discontinued Sept. 30, 1965.

Peak gage height, in feet

Water year	Date	Gage height	Water year	Date	Gage height
1964	Aug. 4, 1964	2.89	1965	----	no flow
	Aug. 12, 1964	4.12			
	Sept. 13, 1964	3.93			

54. Bender Wash near Gila Bend, Ariz.

Location. --Lat 32°54'20", long 112°33'45", on line between secs. 15 and 16, T. 6 S., R. 3 W., 600 ft south of Interstate 10 and State Highway 84, 2.4 miles east of roadside rest area, and 8.8 miles east of junction with U.S. Highway 80 and Interstate 10.

Drainage area. --68.8 sq mi.

Gage. --Crest-stage gage installed Nov. 26, 1963. Datum of gage is 1,165.00 ft above mean sea level.

Remarks. --Base discharge, 100 cfs. Stage-discharge relation defined by current-meter measurements below 30 cfs and by a slope-area measurement at 1,740 cfs. Discharges are approximate. Relation subject to shifting at all stages.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	August 1963	3.6	1,740	1965	Jan. 6 or Feb. 7, 1965	2.24	500
1964	July 14-15, 1964	1.95	300		August 1965	1.60	150
	Aug. 1, 1964	----	200				
	Aug. 12 or Sept. 13, 1964	3.24	1,350				

55. Sauceda Wash near Gila Bend, Ariz.

Location. --Lat 32°52'14", long 112°45'30", in SE¼SW¼ sec. 27, T. 6 S., R. 5 W., at culvert on State Highway 85, 5.3 miles south of Gila Bend.

Drainage area. --118 sq mi, of which 20 sq mi also contributes to an adjoining basin.

Gage. --Crest-stage gage installed in November 1963. Datum of gage is 840.00 ft above mean sea level.

Remarks. --Base discharge, 150 cfs. Stage-discharge relation based on computations of flow through culvert at 1,050, 2,020, and 2,160 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	August 1963	a 3.16	1,050	1964	August 1964	3.23	1,240
	September 1963	b 3.2	b 1,100				
				1965	Feb. 6, 1965	1.85	400
1964	Oct. 19, 1963	a 4.70	2,020		August 1965	1.87	400
	Aug. 1, 1964	2.33	690		August 1965	1.74	330
	Aug. 12, 1964	a 4.92	2,160				

a From outside high-water marks.
b Estimated.

56. Windmill Wash near Gila Bend, Ariz.

Location. --Lat 33°02'54", long 112°50'17", in SE¼ sec. 25, T. 4 S., R. 6 W., on right bank at county road, 10½ miles northwest of Gila Bend.

Drainage area. --12.9 sq mi.

Gage. --Crest-stage gage installed in November 1963. Datum of gage is 600.00 ft above mean sea level.

Remarks. --Stage-discharge relation not defined.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1964	----	----	no flow	1965	Feb. 9, 1965	----	(a)

a Flow did not reach gage; discharge estimated as less than 10 cfs.

57. Military Wash near Sentinel, Ariz.

Location. --Lat 32°50'43", long 113°16'44", in sec. 3, T. 7 S., R. 10 W., on U.S. Highway 80 and Interstate 10, 4.1 miles west of Sentinel and 34 miles west of Gila Bend.

Drainage area. --8.70 sq mi.

Gage. --Crest-stage gage installed July 16, 1963. Datum of gage is 567.65 ft above mean sea level.

Remarks. --Base discharge, 10 cfs. Stage-discharge relation defined by slope-area measurements at 166 and 555 cfs.

Peak gage height, in feet, and discharge, in cubic feet per second, of Military Wash near Sentinel, Ariz.

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 30, 1963	3.03	555	1964	Aug. 3, 1964	1.97	117
1964	Oct. 19, 1963	2.16	166	1965	Jan. 6-7, 1965	1.29	12

58. Black Gap Wash near Ajo, Ariz.

Location. --Lat 32°42'23", long 112°50'43", in NW¼NE¼ sec. 26, T. 8 S., R. 6 W., at culvert on State Highway 85, 5.0 miles north of Midway and 23 miles north of Ajo.

Drainage area. --12.1 sq mi.

Gage. --Flood-hydrograph recorder and crest-stage gage installed June 19, 1963. Datum of gage is 1,026.00 ft above mean sea level.

Remarks. --Base discharge, 25 cfs. Stage-discharge relation defined by theoretical rating for culvert.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
(a)	----	6.7	499	1964	Aug. 1, 1964	5.60	360
					Aug. 12, 1964	3.20	77
1963	Aug. 6, 1963	4.97	280				
	Aug. 17, 1963	2.44	27	1965	Feb. 6, 1965	7.19	560
					Aug. 11-21, 1965	6.36	455
1964	Oct. 18, 1963	8.07	652				

a Date of peak unknown; occurred prior to installation of gage; gage height from high-water marks.

59. Crater Range Wash near Ajo, Ariz.

Location. --Lat 32°33'44", long 112°52'37", in NW¼NW¼ sec. 15, T. 10 S., R. 6 W., at culvert on State Highway 85, 4.1 miles north of the Maricopa-Pima County line and 13.5 miles north of Ajo.

Drainage area. --1.49 sq mi.

Gage. --Crest-stage gage installed in November 1963. Datum of gage is 1,206.00 ft above mean sea level.

Remarks. --Base discharge, 25 cfs. Stage-discharge relation defined by theoretical rating for culvert.

Peak gage height, in feet, and discharge, in cubic feet per second

Water year	Date	Gage height	Discharge	Water year	Date	Gage height	Discharge
1963	Aug. 6, 1963	a 2.42	267	1964	Aug. 1, 1964	1.54	----
1964	Oct. 19, 1963	a 2.52	303	1965	Feb. 6, 1965	1.27	b 15

a From high-water mark.
b Estimated.

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